Construction News

RAILWAYS—STEAM AND ELECTRIC

Proposed Work

Maine—Rockland, South Thomaston & St. George Ry. will build 1-mile extension to line in St. George. Alfred S. Black, Rockland, Pres. and Gen. Mgr.

Massachusetts—Council granted franchise to Springfield Street Railway Co. to lay tracks on Church St. and Broadway, Chicopee Falls. J. F. McCabe, Springfield, Pur. Agt.

Pennsylvania—Northampton Traction Co., Easton, merged with Bangor & Portland Traction Co., plans to build railway from Windgap to Delaware Water Gap. W. O. Hay, Easton, Vice-Pres., Gen. Mgr. and Pur. Agt.

Pennsylvania—Scranton & Binghamton Traction Co., Scranton, contemplates building about 20 miles of railway from Heart Lake to Hallstead via New Milford during 1916. T. C. Dougherty, Scranton, Ch. Engr.

Pennsylvania—Surveys being made by West Penn Traction Co., Pittsburgh, for extension of lines in Butler District. W. E. Moore, Pittsburgh, Vice-Pres. and Gen. Mgr.

Maryland—Curtis Bay R.R. Co. plans to build railway about three or four miles long from Curtis Bay to Hawkins Point, near Baltimore, to connect two plants of Davison Chemical Co. C. W. Miller, interested.

West Virginia—Charleston-Dunbar Traction Co., Charleston, plans to build railway, about 20 miles long. E. W. Alexander, Charleston, Secy., Gen. Mgr. and Pur. Agt.

West Virginia—Reported that Grafton Light and Power Co., Grafton, will build 1 mile of new railway. J. Clyde Lewis, Grafton, Supt. and Pur. Agt.

West Virginia—Morgantown & Wheeling Ry., Morgantown, plans to build interurban railway from Price to Blacksville, 7.45 miles. R. D. Hennen, Morgantown, Ch. Engr.

North Carolina—Goldsboro Street Railway Co., Goldsboro, contemplates building 1 mile of new railway. E. L. Gentir, Goldsboro, Secy. and Gen. Mgr.

Georgia—Surveys being made for extension of Ocilla, Pinebloom & Valdosta Ry. from Willacoochee to Sirmans, Ga., about 20 miles. G. W. Davis, Willacoochee, Gen. Mgr.

Florida—Panama Line, Pensacolo & Missouri Valley Railroad Co., recently chartered, plans to build line from point near Pensacola, Fla., to Kansas City, Mo., and Omaha, Neb., with branches to coalfields in Alabama and Arkansas. Walter D. Seaver, Pascagoula, Fla., interested.

Alabama—Reported that Gulf States Steel Co., Gadsden, will build railway about 3 miles long.

Mississippi—Meridian Light and Railway Co., Meridian, contemplates building 1¾ miles of new railway. A. B. Paterson, Meridian, Gen. Mgr. and Pur. Agt.

Tennessee—Memphis Street Railway Co., Memphis, contemplates extending line in Florida St. to Nonconnah. J. H. Haylow, Memphis, Ch. Engr.

Illinois—Surveys made for extension of line of Palatine, Lake Zurich & Wauconda R.R. from Wauconda to Fox Lake, 10.5 miles. C. H. Patten, Palatine, Gen. Mgr.

Illinois—Springfield Consolidated Railway Co. contemplates extending line east to Bergen Park, Springfield. A. D. Mackee, Springfield, Gen. Mgr. and Pur. Agt.

Minnesota—Duluth Street Railway Co., Duluth, contemplates building 4 miles of new railway. J. Carson, Duluth, Ch. Engr.

Kansas—Kansas Southern Traction Co. contemplates building interurban railway from Parsons to Oswego and Columbus. Philip Strack, Parsons, Interested.

Missouri—Surveys being made and right-of-way being secured for railway from Kansas City, Mo., to Tiffany Springs, Platte County, about 15 miles, for Kansas City and Tiffany Springs Railway Co. W. M. Spratt, Kansas City, Ch. Engr. Noted Nov. 18.

Arkansas—Surveys being made for narrow-gage railroad from Cotter to Rush, about 14 miles, and will traverse Buffalo River and Rush Creek mining districts.

Texas—Dallas Standard Traction Co. asked Council for franchise to build line through Mt. Auburn to Parkview Pl., Dallas. O. A. Zeal, Dallas, Ch. Engr.

Oklahoma—Surveys will soon be made by Guthrie-Edmond Electric Ry. Co., Oklahoma, recently incorporated with $500,000 capital stock, for proposed extension of Oklahoma Electric Ry. from Edmond to Guthrie, Okla. Burke Shartel and Charles Hoopes, Oklahoma, interested.

Oklahoma—Kansas-Oklahoma Electric Co. plans to build railway from Caney to Dewey. S. M. Porter, Caney, interested.

Oklahoma—Okmulgee Northern Ry. Co., recently incorporated, will construct railway from Okmulgee to Coalton, Okla., 12 miles. Lee Clark and Frank L. Hale, interested.

Quebec—Plans being prepared for 5-mile extension from Three Rivers to Cap Magdeleine for Three Rivers Traction Co. Thomas McDougall, Pres.

Ontario—Sarnia Street Ry. Co., Ltd., contemplates building ½-mile line in Sarnia. W. Williams, Sarnia, Ch. Engr.

Ont., St. Thomas—See item under "Industrial Works."

Bids In and Contracts Awarded

Georgia—Contract awarded to THOMAS WORTHINGTON, Birmingham, Ala., for construction of extension of Savannah & Northwestern Ry. from St. Clair to Warrenton, Ga., about 30 miles. L. B. Ackerman, Savannah, Ch. Engr. Noted Oct. 7.

Tennessee—Oneida & Western R.R., Oneida, awarded contract for 2½-mile extension of line to COOK CONSTRUCTION CO. G. H. Jackson, Oneida, Ch. Engr.

Tennessee—Contract awarded to RHODES, McDOWELL & BAKER for 11-mile extension of Tennessee Ry. C. W. Butts, Oneida, Ch. Engr.

Ohio—Wheeling & Lake Erie R.R. awarded contract for grading 3-mile spur to circle east boundaries of Canton to CASEY CONTRACTING CO., Pittsburgh, Penn. W. L. Rohback, Cleveland, Ch. Engr. Noted Nov. 18 and Dec. 23.

LIGHT, HEAT AND POWER

Proposed Work

Vt., Waterbury—C. E. Huntingale, New York, N. Y., has purchased from L. J. Roberts mill and dam on Little River, about four miles from Waterbury, to develop same to generate electricity. Property is capable of developing about 750 hp.

N. Y., Belmont—Allegany County Electric Light and Power Co. plans to construct concrete dam in Genesee River and install electric power plant in Belmont. J. K. Harker and George W. Francis, New York, N. Y., interested.

N. Y., Buffalo—International Railway Co. contemplates an expenditure of $150,000 for enlarging its substations. J. C. Sheldon, Buffalo, Pur. Agt.

N. Y., Buffalo—Plans being prepared by F. J. Neis, Arch., and G. J. Neis, Engr., Delaware, Lackawanna & Western R.R., Hoboken, for power house at passenger terminals of Delaware, Lackawanna & Western R.R. at Buffalo. Noted Sept. 23.

N. Y., Lebanon Springs—Plans being considered for electric-lighting system in Lebanon Springs.

N. Y., New York—(Borough of Queens)—(Official)—Bids will be received by C. B. J. Snyder, Supt. of Schools, Dept. of Education, Park Ave. and 59th St., New York (Borough of Manhattan), until 4 p.m., Jan. 3, for heating and ventilating apparatus in Public School No. 91, Folsom and Fosdick Ave.

N. Y., Seneca Falls—Plans being prepared by M. G. Barnes, Engr., 36 State St., Albany, for one-story, 50x100-ft. hydro-electric plant for Seneca Power Co., Inc. Estimated cost, $250,000. E. H. Gould, Seneca Falls, interested.

N. J., Magnolia—Borough Council contemplates installing electric-lighting system.

Penn., Erie—An addition will be constructed to plant of Erie Lighting Co. Estimated cost, $10,000.

Penn., Lebanon—Plans prepared for power house for Hauer & Mowere.

Penn., Wyomissing—Borough Council passed loan ordinance of $30,000 for purchasing equipment for electric-light plant and has arranged for another loan of $10,000.

Va., Boyce—Northern Virginia Power Co., Winchester, plans to construct transmission line from Boyce to Riverton, via White Post.

W. Va., Buckhannon—Plans being considered for purchasing mill property of D. T. Farnsworth to convert same into power house for furnishing electricity to city and to establish high-pressure water system.

Fla., Ft. Meade—See item under "Water-Works."

Ala., Moulton—Plans being considered by C. C. Prince and H. C. Dunn for electric-light plant in Moulton.

Miss., Sumner—Southern Electric Service Co. contemplates an expenditure of $14,000 for improvements to its plant. A. C. Carl, Winona, Mgr.

Tenn., Sharon—Citizens voted $10,000 bonds for electric-light plant.

Ohio, Belle Center—City will issue $8,000 bonds for rebuilding municipal electric-light plant.

Ohio, Piqua—Dayton Power and Light Co. has taken over plant of Miami Light, Heat and Power Co. and will improve same.

Mich., Allegan—Consumers Power Co. plans to extend its transmission line from Allegan to South Haven via Fennville, Pullman and Lee. Company also contemplates dam across Kalamazoo River.

Mich., Muskegon—Muskegon Heights Gas Co., recently incorporated, will construct gas plant.

Mich., Whitehall—Frugale Power Co. contemplates enlarging its hydro-electric plant. F. H. Speese, Vice-Pres. and Mgr.

Ill., Byron—Byron Electric Light and Power Co., recently incorporated with $15,000 capital stock, plans to build electric-light plant in Byron.

Wis., Manitowoc—Plans being prepared for power and boiler house for municipal electric-light and water-works systems.

Wis., Racine—Wisconsin Gas and Electric Co., subsidiary of Milwaukee Electric Railway and Light Co., Milwaukee, will build 80x165-ft. addition to retort house. Estimated cost, $25,000.

Iowa, Guttenberg—Citizens voted to construct municipal electric-light plant.

Iowa, Rhodes—Press reports state that Iowa Railway and Light Co. has been granted franchise for transmission line and distribution system for furnishing electric-light and power.

Minn., Mazeppa—City contemplates expenditure of $10,000 for improvements to municipal electric-light plant.

Kan., Circleville—Citizens voted to issue bonds for municipal electric-light plant.

Kan., Riley—R. B. Fegan, Junction City, granted franchise for electric-light plant in Riley. Noted Dec. 16.

Neb., Pleasant Dale—Martz Engineering Co., First National Bank Bldg., Lincoln, preparing plans for municipal electric-light plant. Estimated cost, $5,000.

Ark., Van Buren—Bids will be received about Jan. 10 by Crawford Gas and Oil Co., recently incorporated with $250,000 capital, for 10 miles of 6-, 8- and 10-in. piping. C. H. Reece, Engr.

Tex., Portland—Bids will be received until Jan. 1 by M. S. Spitler for constructing electric-light plant. J. B. Moore, Engr. Noted Dec. 16.

Okla., Lawton—Franchise granted to Albert T. Woods and associates for gas plant in Lawton.

N. M., Albuquerque—A. G. Hillberg, 13 Park Row, New York, N. Y., preparing plans for 30,000 hp. hydro-electric plant at mouth of White River Cañon on Rio Grande River. Estimated cost, $2,000,000. C. G. Wilfong, Philadelphia, Penn., Pres.

N. M., Clovis—See item under "Water-Works."

Idaho, Pocatello—(Official)—We have been informed that bids for extending street lighting system will be received next spring. Estimated cost, $35,000. J. H. Giles, City Engr. Noted Dec. 9.

Ariz., Casa Grande—See item under "Water-Works."

Ariz., Miami—See item under "Water-Works."

Ariz., Phœnix—Young Men's Business Association is interested in project to install electric-light plant in Phœnix.

Ariz., Prescott—Surveys being made for constructing water storage dam and hydro-electric plant on Burro Creek, near Prescott. E. P. Thayer, Indianapolis, Ind., interested.

Wash., Blueslide—Surveys being made by engineers of Hugh L. Copper Co. for power dam about one mile north of Blueslide. The hydrochemical and power project will involve an expenditure of $10,000,000.

Wash., Okanogan—Okanogan Valley Power Co. will extend its transmission lines along Okanogan River between Okanogan and Malotte.

Ore., Conway—J. Frank Jones, Mayor, considering draft for franchise proposed by G. C. Hardin, Ft. Smith, for supplying natural gas to Conway from Kibler Fields in Crawford County.

Ore., Stayton—Stayton Electric Light Co. will enlarge its power plant.

Calif., San Francisco—Great Western Power Co. plans an expenditure of $4,000,000 for improvements. M. Fleishacker, Pres.

Que., Sherbrooke—Bids will soon be received for enlarging and improving power plant. M. A. Sammett, 301 McGill Bldg., Montreal, Consult. Engr.

Que., Warwick—Plans being considered for electric-light and power systems. Estimated cost, $10,000.

Ont., Aylmer—City plans to build several large additions to its electric-light plant.

Ont., Sarnia—Election will be held Jan. 3 to vote on by-law providing $120,000 for purchasing electric generating plant and electric distribution system of Sarnia Gas and Electric Co. and for remodeling same.

Ont., Springfield—City will install electric-light plant. Estimated cost, $5,000. J. B. Lucas, Clk.

Ont., West Lorne—City plans to build electric-light and power plant. Estimated cost, $80,000. J. S. Robertson, St. Thomas, Clk.

Bids In and Contracts Awarded

Penn., Philadelphia—Contract for boiler house for Pennsylvania Sugar Co. awarded to O'MERA CONSTRUCTION CO., 235 South Turner St., Philadelphia. Estimated cost, $40,000.

Va., Fredericksburg—Contract for electric-light plant and system for Southern Gravel Co., about 4 miles from Fredericksburg, awarded to RAPPAHANNOCK ELECTRIC LIGHT AND POWER CO., Fredericksburg.

Mich., Charlevoix—GENERAL ELECTRIC CO. OF MICHIGAN, Detroit, awarded contract for furnishing all electric-light meters for year ending Nov. 24, 1916.

Ill., Chicago—Contract for one-story boiler house at 4345-53 South Western Ave. for Union Petroleum Co. awarded to H. B. Barnard. Estimated cost, $15,000.

BRIDGES

Proposed Work

N. J., Perth Amboy—Bids will be received until 8:30 p.m., Jan. 5, by Board of Water Commissioners, for trestle over South Amboy-Bordentown Turnpike at Runyon. S. J. Mason, City Engr.

Va., Lunenburg—(Official)—Bids will be received at Office of Clerk, Lunenburg Court House, until noon, Jan. 3, for reinforced-concrete bridge across Middle Meherrin River. G. P. Coleman, Richmond, State Highway Comr.

W. Va., Berkeley Springs—(Official)—Bids will be received until Jan. 14 by County Court of Morgan County for two reinforced-concrete arch bridges of 60- and 80-ft. spans respectively. Plans prepared by West Virginia State Road Bureau, Morgantown, W. Va. R. P. Davis, Bridge Engr. West Virginia State Road Bureau.

Tenn., Manchester—City and Nashville, Chattanooga & St. Louis Ry. will build viaduct over railway tracks.

Tenn., Nashville—City Commission, Nashville, Chattanooga & St. Louis Ry. and Nashville Traction and Light Co. will lengthen and repave Church St. viaduct. Estimated cost, $90,000. W. W. Southgate, City Engr.

Ohio, Lima—City Council plans to construct viaduct over Ottawa River between North and South Lima. Estimated cost, $50,000. Carl Bryson, City Engr.

Ill., Ottawa—Citizens of La Salle Township will issue $85,000 bonds for Shippensport Bridge. Noted Oct. 7.

Iowa, Waverly—Bids will be received by County Auditor until Jan. 6 for substructure of bridge across Cedar River. Estimated cost, $4,500. C. A. Cool, County Engr.

Mo., St. Joseph—St. Joseph & Grand Island R.R. contemplates an expenditure of about $50,000 for repairing pivot pier of Missouri River bridge.

Mo., St. Louis—City Plan Commission has recommended construction of Kingshighway Blvd. viaduct over Broadway. Estimated cost, $60,000.

Mo., Warrensburg—Bids will be received by David Mohler, County Engr., until Jan. 4, for 20 steel bridges. Noted Sept. 23.

Tex., Ft. Worth—Bids will be received until Jan. 3 by Commissioners of Tarrant County for reconstructing Park St. Bridge. Estimated cost, $7,500. H. P. Haynes, County Engr. Noted Dec. 23.

Tex., Riverside—Commissioners of Trinity County, Groveton, and Walker County, Huntsville, will build bridge across Trinity River at Riverside. Estimated cost, $60,000, to be divided equally between the two counties.

Okla., Oklahoma—Bids will be received until Jan. 10 for 12 reinforced-concrete bridges in Oklahoma County. Estimated cost, $35,000. M. Cornelius, County Clk.

Okla., Sulphur—All bids recently received for bridge across Washite River rejected. New bids will be received until Jan. 20 by B. B. Horsman, Clk. of Murray County.

Ariz., Tucson—Bids will be received by L. O. Cowan, City Clk., until 5 p.m., Jan. 15, for reinforced-concrete bridge across Santa Cruz River. Estimated cost, $50,000. Noted Sept. 16.

Ore., Portland—Plans prepared for 400-ft. bridge over Balch Creek Cañon to connect Cornell Rd. with Lincoln Blvd. Estimated cost, $135,000. Philip H. Dater, City Engr.

Calif., Los Angeles—Bids will be received by H. J. Lelande, County Clk., until 2 p.m., Jan. 3, for bridge on Palm Ave.

Calif., Los Angeles—Bids will be received by H. J. Lelande, County Clk., until 2 p.m., Jan. 3, for bridge on Mountain Ave.

Calif., Sacramento—State Highway Commission will build bridge across Eel River near Scotia in Humboldt County. Estimated cost, $90,000, and Humboldt County will pay $40,000 of cost.

Bids In and Contracts Awarded

Penn., Philadelphia—Contract for Diamond St. Bridge over connecting railway awarded to CANTRELL CONSTRUCTION CO., Philadelphia, at $60,758. Noted Dec. 9 and 23.

Penn., Phœnixville — (Official) — Contract for reinforced-concrete bridge across Schuylkill River between Phœnixville and Mont Clare awarded to AMBLER-DAVIS CO., Hanson Bldg., Philadelphia, at $80,894. Noted Dec. 9.

Va., Norfolk—Contract for bridge over Tanner's Creek on Jamestown Blvd. awarded to ALSOP & PIERCE, at $28,780.

Fla., Clearwater—(Official)—We have been informed that bridge from Clearwater to Clearwater Key will be built by E. W. Parker and associates under supervision of E. W. Parker and not by Pinnellas County as stated in our issue of Dec. 9. Work will be done by their own forces and no bids received.

Ohio, Marysville—Contract for steel bridge over Buck Run awarded to JOHN L. PORTER, Marysville, at $4,631.

Ind., Indianapolis—Dunn-McCarthy Co., Chicago, Ill., at $53,659, submitted only complete bid for bridges, abutments and undergrade to crossings connected with crossing improvements at Drover St. and White River levee under Cleveland, Cincinnati, Chicago & St. Louis Ry. and Vandalia R. R.

Ind., Linton—Contract for Joshua Neal Bridge in Stockton Township, near Linton, and Lukenbill Bridge in Stafford Township, near Marco, awarded to VINCENNES BRIDGE CO., Vincennes.

Ill., Bellflower—(Official)—Contract for steel bridge in Lexington Township awarded to PORTER-McCULLY CONSTRUCTION CO., Mackinaw, at $12,990. Noted Dec. 2.

Ill., Watseka — (Official) — Contract for reconstructing bridge No. 137 awarded to CONTINENTAL BRIDGE CO., Peotone, at $6,100. Noted Dec. 2.

Neb., Tekamah—(Official)—Contract for concrete culverts awarded to H. J. CATHROE, Omaha, at $21,330. Towl Engineering Co., Omaha, Engr.

Tex., El Paso—Contract for four bridges across Rio Grande River awarded to EL PASO BRIDGE AND IRON CO., El Paso, at $24,000.

WATER-WORKS

Proposed Work

Maine, Lewiston—Maine Public Utilities Commission gave authority to Wilton Water Co. to issue $8,000 bonds for installing new intake stream chamber and new pipes.

Maine, Madison—Citizens contemplate 14-in. water main from Hancock Pond. Estimated cost, $130,000.

N. Y., Liverpool—Citizens considering installation of water system. Estimated cost, $25,000.

N. J., Peapack—Borough sold $55,000 bonds for municipal water plant.

Penn., Danville—Bids will be received Jan. 19 by Water Commissioners for reinforced-concrete rapid sand filter of 300,000 gal. capacity. Chester & Fleming, Union Bank Bldg., Pittsburgh, Penn., Engr.

Penn., Leighton—(Official)—Plans being prepared for water works system. W. N. Bowyer, City Engr. Noted Dec. 16.

Va., Norfolk—(Official)—Bids will be received by Board of Control until Jan. 8 for repairing three dams and spillways. Estimated cost, $56,000. T. B. Bornin, Engr.-in-charge. Noted Nov. 4. (See adv.)

W. Va., Buckhannon—See item under "Light, Heat and Power."

W. Va., Fairmont—City contemplates installing water meters. Estimated cost, $30,000. Ira Smith, Commr. Water and Sewers.

Ga., Savannah—City plans expenditure of $15,000 to extend water mains. E. R. Conant, Ch. Engr. Water Dept.

Fla., Ft. Meade—City sold $33,000 bonds for extension of sewer system, water-works and construction of new electric-light plant.

S. C., Charleston—Citizens defeated $1,500,000 bonds for water-works. Noted Dec. 2.

Miss., Oxford—J. H. Lawshee, City Clk., will issue $6,500 bonds for water-works and electric-light improvements.

Miss., Pass Christian—Bids will be received until Jan. 4 for laying 4-in. water main in Davis Ave. near Third St. to North Railroad St. W. A. Terrell, City Clk. Noted Sept. 23.

Tenn., Sharon—Citizens voted $25,000 bonds for water-works system and electric-light plant.

Ky., Glasgow—W. M. Dickinson and others have purchased property of Glasgow Water Co. and plan considerable improvements.

Ky., Hazard—Hazard Water Co. contemplates extending pipe through all main streets and installing filtration plant at power house.

Ohio, Akron—State will order installation of water meters capable of measuring flow through 20-in. pipe at plants of large consumers of canal water in Akron and Cincinnati manufacturing districts. Frank R. Fauver, State Supt. of Pub. Wks.

Ohio, South Charleston—Bids received Dec. 14 for water system rejected. Work will be readvertised. W. L. Wentz, City Clk. Noted Dec. 9.

Ind., Ligonier—City Council voted to extend water mains in North Main, North and Chatham St.

Ind., Miller—(Official)—Citizens voted $12,500 bonds for water works system. Carl Olander, City Clk.

Mich., Albion—(Official)—Citizens voted $10,000 bonds for completing municipal water system. J. W. Smith, City Clk. Noted Nov. 11.

Mich., Menominee—Menominee Water Co. will sell $200,000 bonds for municipal water-works system. Noted Nov. 11.

Mich., Monroe—James W. Follin, Engr., submitted reports for water-supply system, also recommends installation of filtration plant.

Mich., Mt. Morris—(Official)—Bids will not be received until spring for installation of water system. H. W. Graham, Pres. Noted Dec. 2.

Ill., Bluffs—Fuller-Coult Co., Chemical Bldg., St. Louis, Mo., retained to prepare preliminary plans for water works system.

Ill., Glasford—Fuller-Coult Co., Chemical Bldg., St. Louis, Mo., preparing plans for water works system.

Ill., Lebanon—Fuller-Coult Co., Chemical Bldg., St. Louis, Mo., preparing preliminary plans for water works system.

Ill., Virden—Fuller-Coult Co., Chemical Bldg., St. Louis, Mo., preparing preliminary plans for water works system.

Iowa, Ft. Madison—Citizens recently voted for sewer system.

Iowa, Iowa City—City Council plans to improve water works. Estimated cost, $50,000.

Iowa, Winterset—Citizens will soon vote on $15,000 bonds for water works.

Minn., St. Paul—Bids will be received until Jan. 17 by August Hohenstein, City Pur. Agt., for 30,000,000-gal. and 7,000,000-gal. covered reservoir, 15,000,000-gal. pumping engine, motor driven, revolving screening equipment. Estimated cost, $10,000. Noted Sept. 30.

Minn., St. Paul—William M. Jones preparing plans for water system. Estimated cost, $500,000.

Kan., Humbolt—Plans for municipal water-works system approved by Public Utilities Commission. Estimated cost, $12,000. Noted Dec. 16.

Mont., Three Forks—City contemplates improvement of water system. Estimated cost, $12,000. Noted Nov. 4.

Ark., Beebe—Contract for water system will be let in February. Estimated cost, $15,000. Lund & Hill, Little Rock, Ark., Consult. Engr. Noted Dec. 2.

Ark., Dardanelle—City retained J. F. Halliday, McAlester, Okla., as engineer for improvements to water works. Estimated cost, $15,000. Noted Dec. 23.

Tex., Carthage—See item under "Sewers."

Tex., Cooper—See item under "Sewers."

Tex., Ft. Worth—Citizens will vote Jan. 6 on $500,000 bonds for water-works system.

Tex., Mart—City sold $18,000 bonds for improvements to water works. J. L. Vaughn, Mayor. Noted Dec. 2.

Tex., Texarkana—Citizens voted to improve water-works system.

Tex., Trinity—Plans prepared for water system. H. S. Wilder, Houston, Consult. Engr. Noted Dec. 2.

Okla., Stillwater—Citizens defeated $116,000 bonds for water works system.

N. M., Clovis—City Council will hold election to vote on $25,000 bonds for extension and improvement to sewer, water and light systems.

Idaho, Downey—W. D. Cotton, Engr., Idaho Falls, retained by City Council to prepare plans for water system.

Idaho, Pocatello—City sold $400,000 bonds for municipal water system. Noted Oct. 14.

Utah, Providence—Town Board plans new water-works system.

Ariz., Casa Grande—Citizens will vote on bonds for municipal water works and electric-light plant. E. R. Stoner, City Clk.

Ariz., Miami—Citizens voted $80,000 bonds for municipal water system; also $40,000 bonds for municipal electric-light plant. Noted Dec. 2.

Wash., Colville—City Council retained Sawyer Bros., Engr., Spokane, for construction of new water supply system. Estimated cost, $15,000. Noted Oct. 7.

Wash., Ridgefield—Bids will be received by J. W. Blackburn, Town Clk., until Jan. 4 for water system. Estimated cost between $10,000 and $15,000. Noted Nov. 11.

Wash., Seattle—Board of Public Works considering plans for water mains in Michigan St. Estimated cost, $10,000. J. H. Dimock, City Engr.

Wash., Seattle—Board of Public Works considering plans for water mains in Orcas and Doris St. Estimated cost, $10,000. A. H. Dimock, City Engr.

Ore., Grants Pass—Citizens defeated proposition to purchase and improve water system. Estimated cost, $120,000.

Ore., Turner—R. O. Thomas, Mayor-elect, contemplates the installation of a water system.

Que., Sherbrooke—City Council will install water main in Wellington St. Estimated cost, $4,720. F. McKean, Supt., Water-Works Dept.

Ont., Dryden—Plans prepared for water system. Estimated cost, $25,000. B. S. McKenzie, 1002 Union Trust Bldg., Winnipeg, Consult. Engr. Noted Dec. 2.

Ont., Dundas—Plans being prepared for water mains in several streets. R. W. Karch, Chn. Pub. Utilities Comn.

Ont., Midland—Citizens plan expenditure of $13,000 for addition to its water-works plant. Frank R. Weston, City Clk.

Ont., Unionville—Plans being prepared by J. E. James, City Engr., 57 Adelaide St. E., Toronto, for water-works system. Estimated cost, $14,000.

Bids In and Contracts Awarded

R. I., Cranston—(Providence post office)—Low bids received for making wash and core borings were as follows: Sprague & Henwood, Inc., Scranton, Penn., at $10,460; William Gates Stearns, Jamaica, N. Y., at $12,380; Alliance Well Co., Providence, R. I., at $12,830. Walter B. Chafee, City Clk. Noted Dec. 9.

N. Y., New York—(Official)—Lowest bid submitted for furnishing apparatus and appurtenances for applying liquid chlorine to Croton water-supply at Dunwoodie, Yonkers, was that of Wallace & Tiernan Co., Inc., 136 Liberty St., New York, at $6,645. Noted Dec. 16.

N. J., Secaucus—Contract for water pipe line connections at County Road and County Farm, awarded to CULLIGAN & MACH, 122 West 26th St., Bayonne.

N. J., Ventnor—(Official)—Contract for supply of pumps and air compressors awarded to JOSEPH T. SURIGARD & CO., Philadelphia, Penn. Estimated cost, $30,674. Noted Nov. 11.

Penn., Philadelphia—Lowest bids received for equipment for city pumping stations were as follows: Coal storage and handling equipment, Specialty Engineering Co., Trenton and Allegheny Ave., Philadelphia, $17,950; stokers and superheaters, Combustion Engineering Corporation, $17,950; blowers, S. F. Sturtevant Co., $1,900; c.-i. pipes and special fitting., Standard Cast-Iron Pipe and Foundry Co., Bristol, Tenn., $6,427; mechanical stoker equipment, Combustion Engineering Corporation, $15,864.

Ga., Fitzgerald—Contract for reinforced-concrete clear-water basin awarded to CASE & COTHRAN, Candler Bldg., Atlanta, Ga. Estimated cost, $6,500.

Ohio, Cleveland—Contract for water mains in South Woodland Rd., awarded to LANSEE CO., Cleveland Heights. Estimated cost, $20,000. F. A. Pease Engineering Co., Marshall Bldg., Cleveland, Engr. Noted Dec. 9.

Ohio, Wilberforce—Contract for improvements to water supply system awarded to SHARTLE MACHINE CO., Columbus. Noted Dec. 2.

Mich., Albion—(Official)—Low bidders for pumping station and boiler house for water system were F. W. Schmacher, Albion, at $7,688; Weston Bros., Albion, at $11,072. J. C. Smith, City Clk. Noted Dec. 9.

Mich., Detroit—Contract for water-works system awarded by Board of Water Commissioners to GAMON METER CO., Newark, N. J.

Ill., Frankfort—Contract for new water mains awarded to CHICAGO HEIGHTS COAL CO., Chicago. Estimated cost, $10,919.

Ill., Galesburg—(Official)—Bids for tubular deep well rejected. F. L. M. Connolly, City Engr. Noted Dec. 16.

Wis., West Allis—Contract for laying water main in 50th Ave. awarded by City Council to H. HOHENSE.

N. D., Velva—City Council rejected all bids for improvements to water works.

Tex., Dallas—(Official)—Contract for new water pipes in Oakcliff St. awarded to AMERICAN CAST IRON PIPE CO. Estimated cost, $215,000. J. M. Preston, City Engr. Noted Dec. 16.

Ore., Gaston—Contract for water works system awarded to V. R. DENNIS, Lewis Bldg., Portland. Estimated cost, $7,500.

Ore., Milwaukee—Low bidders for water works system were: Giebisch & Joplin, Portland, $22,542; Oskar Huber, Portland, $24,666; J. F. Shea, Portland, $24,982. J. W. Morris, City Engr. Noted Nov. 25.

Que., Princeville—Contract for water system, pumping station, also 4-in. and 6-in. c.-i. pipes, valves, pumps, hydrants, etc., awarded to B. FEENEY. Estimated cost, $25,000. Noted Dec. 9.

Ont., Brockville—Contract for filtration plant awarded to ROBERTS FILTRATION CO., Derby, Penn. Estimated cost, $86,000. Noted Oct. 22.

B.C., Port Moody—Contract for supply pipe for new water-works system awarded to CANADIAN PIPE CO.

SEWERS

Proposed Work

Mass., New Bedford—Bids will be received until Jan. 12 for installing intercepting sewers. Estimated cost, $65,000. William F. Williams, City Engr. Noted Oct. 21.

N. Y., Buffalo—City plans expenditure of $4,000,000 for sewage-disposal plant.

N. Y., New Rochelle—Board of Estimates passed $50,000 bond issue for sewage-disposal plant.

N. Y., North Tonawanda—Citizens plan expenditure of between $150,000 and $160,000 for sewage-disposal plant.

N. Y., Oneonta—(Official)—Bids will be received next spring for sewage-disposal plant. Estimated cost, $45,000. F. M. Gurney, City Engr. Noted Dec. 16.

N. Y., Utica—Harry R. Hays, Commissioner of Public Works, recommends that plans be prepared for improvements to sewer system.

N. J., Jersey City—Board of Commissioners approved installation of new sewer in Horseshoe Section.

Md., Baltimore—Citizens defeated $40,000 bonds for three sanitary sewers.

Va., Norfolk—City will construct concrete drain and culvert in south end of Dinwiddie St. W. T. Brooke, City Engr.

N. C., Greensboro—Citizens voted $75,000 bonds for improving and extending sewers and water mains. Noted Nov. 11.

N. C., Kings Mountain—City contemplates sewer system.

Fla., Ft. Meade—See item under "Water-Works."

Fla., Gainesville—See item under "Streets and Roads."

Fla., Gainesville—(Official)—Bids will be received in February for extension of sewer system. Estimated cost, $12,000. G. H. Cairns, City Engr. Noted Dec. 16.

Fla., Key West—John J. Quinn and John R. Pearson applied for franchise to construct sewer system.

Tenn., Nashville—City Commissioners plan to build new sewers. Estimated cost, $300,000. W. W. Southgate, City Engr.

Ky., Paducah—See item under "Buildings."

Ohio, Greenville—Plans been prepared for trunk sewer in Greenville. Estimated cost, $50,000.

Ohio, Lancaster—City plans storm sewer in South Broad St. from Hocking River to Main St. Estimated cost, $8,200.

Ohio, Middletown—Bids will be received by City Commission, City Hall, until noon, Jan. 4, for storm and sanitary sewer in various streets.

Ohio, Portsmouth—City Council sold $32,500 bonds for sewer construction.

Ohio, Youngstown—Bids will soon be received for sewer in Mill Creek Sewer District. Frank Little, City Engr. Noted Oct. 21.

Ind., Fairmount—(Official)—W. J. Sherman Co., Toledo, Ohio, has been retained to prepare plans for complete sanitary sewer system.

Ill., Alton—J. E. Schwaab, City Engr., is preparing plans for East Side trunk sewer. Noted Sept. 16.

Iowa, Clinton—Bids will be received until Jan. 11 for storm sewer in First St. Estimated cost, $5,323.

Iowa, Hampton—Bids will be received until Jan. 7 for sanitary sewer system. P. A. Van Pelt, City Clk. Noted Dec. 23.

Iowa, Rock Valley—Press reports state citizens contemplate sewer system.

Iowa, Waterloo—Citizens comtemplate sewer system and sewage-disposal plant. Estimated cost, $5,000. Burns & McDonnell, 821 Scarritt Bldg., Kansas City, Mo., Engr.

Kan., Kansas City—City plans to construct sewer system. J. L. Beggs, Street Comr.

Neb., Pierce—Bids will be received about Mar. 1 by L. P. Connor, City Clk., for sewer system. Estimated cost, $20,000. Noted Dec. 23.

Mo., St. Louis—Bids will be received by city until noon, Jan. 7, for constructing North Baden public sewer, First Section, also for sewers in Glaise Creek Sewer District No. 12.

Tex., Carthage—City Council contemplates sewer and water works systems.

Tex., Cooper—City contemplates sewer and water works system.

Tex., Dallas—Bids will be received about Jan. 15 for purchase of $350,000 bonds for sewage-disposal plant.

Tex., Dallas—City Commissioners will soon receive bids for sanitary sewer main between Zang's Blvd. and Winnetka Ave. in Oakcliff. Estimated cost, $21,500. Noted Nov. 11.

Tex., Graham—Citizens will vote on bonds for sewer system. Noted Dec. 16.

Tex., Venus—City will hold election Jan. 11 to vote on $10,000 bonds for sewer system.

Okla., Enid—Plans being prepared for sewer system in three new sewer districts and for extensions in two districts. W. C. Rogers, City Clk. Noted Dec. 2.

N. M., Clovis—See item under "Water-Works."

Ore., La Grande—Contract for sewer system will be let in January. Estimated cost, $16,000. L. D. Howland, City Engr. Noted Dec. 9.

Calif., Pomona—Board of Trustees approved plans for sewer system. Estimated cost, $55,000.

Bids In and Contracts Awarded

Mass., Needham—(Official)—Contract for sewer work in Section No. 104 awarded to BAY STATE DREDGING CONTRACTING CO., 247 Atlantic Ave., Boston. Estimated cost, $59,055. Noted Dec. 23.

Mass., Needham—Contract for sewer work in Section No. 103 awarded to BRUNI & POTITTI, 18 Tremont St., Boston. Estimated cost, $34,011.

N. Y., Buffalo—Contract for sewer in Swan and Seneca St., awarded to JOSEPH F. STABELL CONSTRUCTION CO., Niagara St., Buffalo. Estimated cost, $110,693. George H. Norton, City Engr.

N. Y., Mt. Vernon—Contract for sewers awarded to FRED W. BURNHAM, 30 East 42nd St., New York, N. Y.

N. J., Jersey City—Contract for pipe sewer in Wade St. to connect with sewer in Ocean Ave., awarded to CHARLES O'NEILL. Noted Nov. 18.

Md., Baltimore—Low bids received for lateral sewers in District No. 34C, Sanitary Contract No. 170 were from Glass & McAleer, 2030 Hartford Ave., Baltimore; in District No. 39C, Sanitary Contract No. 171, W. H. & C. F. Thompson, 530 East 70th St., Baltimore. Noted Nov. 25.

Ala., Citronelle—Contract for sewer system awarded by city to J. W. GURLEY & CO., Mobile. Estimated cost, $28,088. Edgar B. Kay, Tuscaloosa, Engr. Noted Oct. 14.

Ohio, Springfield—Low bids for constructing a number of sewers in various streets were received from Huonker & Krumholtz, at $4,579 and R. J. Cavanaugh, at $4,857. Noted Nov. 15.

Ind., Mishawaka—Contract for sewers in Wenger Ave. from Lincoln Highway to Homewood Ave. awarded to M. SMITH, Elkhart.

Ind., Wabash—Contract for sanitary sewers in Thorne and Market St., awarded to GEORGE E. HIPSKIND. W. L. Agan, City Engr.

Mich., Grand Rapids—Board of Public Works awarded contract for sewer in Sheridan Ave. to DEBRUINE & NEUWSEN.

Minn., Belle Plaine—Contract for sanitary sewers in Market, Forest and Meridan St. awarded to ILLSTRUP & OLSEN, Minneapolis. Estimated cost, $6,804. Noted Dec. 2.

Minn., St. Paul—(Official)—All bids rejected for sewer in Eaton St. O. Claussen, City Engr. Noted Dec. 16.

Minn., St. Paul—Contract for installing 4,300 ft. 15-in. to 36-in. sewer awarded to TANNER BROS., Detroit, Mich. Estimated cost, $24,490.

Kan., Cherryvale—(Official)—Contract for sewers in District No. 2 awarded to AXTEL & OLDHAM, Kansas City, Mo. Estimated cost, $14,401. Noted Nov. 25.

Kan., Hutchinson—(Official)—Contract for sanitary sewer for Hyde Park addition awarded to J. H. SHEARS & SONS, Hutchinson. E. Metz, City Clk. Noted Oct. 21.

Neb., Lincoln—(Official)—Contract for storm sewer in J St. awarded to CATHROE CO., Omaha, Neb. Estimated cost, $5,391. T. H. Berg, City Clk. Noted Dec. 16.

Tex., Houston—Contract for sewer improvements awarded as follows: HORTON & HORTON, Burnett St. sewer, at $70,500; Paschal St., North Main to Cochran St., at $17,600; DAVIS BROS., White Oak and Florence St. sewer, at $2,000. E. E. Sands, City Engr. Noted Dec. 9.

Ore. Portland—Contract for sewers in various streets awarded to W. S. WEAVER, Portland. A. L. Barbour, City Clk. Noted Sept. 30.

Calif., San Francisco—(Official)—Low bidder for sewer system in South Bay View District was Tibbetts-Pacific Co., 16 California St., San Francisco, at $37,788. M. M. O'Shaughnessy, City Engr. Noted Dec. 2.

Ont., Hull—Citizens will install sewers in Scott and Chateauguay St. by day labor. J. P. A. Laforest, City Engr.

Ont., Ottawa—City will construct sewer by day labor. Estimated cost, $425,000. F. C. Ashwith, City Engr. R. S. & W. S. Lea, 10 Cathcart St., Montreal, Que., Consult. Engr. Noted Nov. 4.

Ont., Sarnia—Contract for sewers in Stewart St., N., Stewart St., S., and William St. awarded to PATRICK CORRIGAN. Estimated cost, $4,626.

Ont., Toronto—Contract for sewers in various streets awarded to W. E. TAYLOR, 43 Clinton St., Toronto. Estimated cost, $22,000. Noted Dec. 16.

GARBAGE

Proposed Work

N. Y., Binghamton—John A. Giles, City Engr., recommended to City Council construction of garbage incinerating plant on Noyes Island. Estimated cost, $110,000.

N. Y., New York—(Borough of Manhattan)—(Official)—Bids will be received by J. T. Fetherston, Comr. of Street Cleaning, Municipal Bldg., until noon, Jan. 18, for final disposition of garbage from boroughs of Manhattan, Bronx, Brooklyn and of City of New York on city land, Form No. 2.

N. Y., New York—(Borough of Manhattan)—(Official)—Bids will be received until noon, Jan. 18, at Room 1247, Municipal Bldg., Borough of Manhattan, for disposal of garbage for period of five years in Boroughs of Manhattan, Bronx and Brooklyn. (See adv.) Plans and specifications on file at office of "Engineering News," 36th St. at Tenth Ave., New York.

Ohio, Cleveland—Bids will be received until noon, Jan. 4, by Adam H. Graham, Dir. of Pub. Ser., for disposal of garbage for period of two years, from Apr. 1, 1916, to Apr. 1, 1918.

Ohio, Columbus—Bids will be received until noon, Jan. 4, by George A. Borden, Dir. of Pub. Ser., for purchase of garbage grease and tankage produced at Municipal Reduction Plant.

Wis., West Allis—Bids will be received until 7:30 p.m., Jan. 3, by E. J. Oberst, City Engr., for municipal garbage incinerator. Estimated cost, $5,000. Noted Dec. 2.

Bids In and Contracts Awarded

N. Y., Utica—Contract for collection and removal of garbage for five years, from Jan. 1, 1916, to Dec. 31, 1920, awarded to DANIEL T. BECKER and JOHN J. O'NEILL, Utica, at $125,940.

N. Y., Utica—Contract for cleaning paved streets of city for five years from Jan. 1, 1916, to Dec. 31, 1920, awarded to HARRY W. ROBERTS CO., Utica, at $332,400.

Penn., Philadelphia—Contract awarded by Department of Public Works for collection and disposal of garbage for 1916 to PENN REDUCTION CO., at $373,588. Noted Nov. 111.

Del., Wilmington—Board of Health awarded contract for disposal of garbage for period of nine years to WILMINGTON SANITARY CO., at $81,500. Noted Oct. 21.

STREETS AND ROADS

Proposed Work

Mass., Cambridge—City Council has appropriated $50,000 for paving Massachusetts Ave. from City Hall to Quincy Sq., and $7,000 for paving Munroe St.

N. Y., Dryden—Stone road will be constructed from Dryden and Groton town line at McLean through DeBoudre's Farm on Dryden-Courtland macadam road.

N. Y., New York—(Borough of Brooklyn)—Official)—Bids will be received by L. H. Pounds, Borough Pres., until 11 a.m., Jan. 6, for furnishing and delivering asphalt, granite and wood paving blocks, 5,000 bbl. portland cement and 2,000 cu.yd. paving sand.

N. Y., Syracuse—Council considering proposition to extend Massena St. through to intersection of Tully and Ontario St. Estimated cost, $100,000.

N. J., Jersey City—Bids will be received by J. C. Sweeney, Clk., Blvd. Comrs., until 11 a.m., Jan. 5, for 40,000 gal. asphaltic road oil, 100,000 gal. asphaltic road binder, about 4,000 yd. crushed stone, 12,000 ft. wire No. 6 and 8 and 750 gal. engine oil.

W. Va., Clarksburg—Press reports state that citizens of Portland District, Preston County, contemplate $250,000 bond issue for road from Albright on Morgantown & Kingwood R.R. to Maryland state line.

W. Va., Morgantown—Bonds for $300,000 sold for road improvements in Morgan District.

W. Va., Welch—Citizens voted $293,000 bonds for road construction in Sandy River District, McDowell County. Noted Nov. 18.

N. C., Greenville—Bonds for $50,000 voted by citizens of Pitt County, Chicod Township, for road work. S. A. Congleton, Chn. of County Comrs.

Ga., Atlanta—Commissioners of Fulton County contemplate 2-mile boulevard around lake at Lakewood.

Ga., Atlanta—Ivy St. will be paved with asphalt from Peachtree St. to Edgewood Ave. Estimated cost, $13,600.

Ga., Savannah—Appropriation of $65,000 made by city for street improvements.

Ga., Tifton—City will issue $10,000 bonds for paving.

Fla., Gainesville—(Official)—Bids will be asked in two or three months for paving portion of University Ave. and extending sewer system. Citizens recently voted $21,000 bonds for this purpose. Noted Dec. 16.

Fla., Palatka—County plans to build sand asphalt road to Orange Springs, 18½ miles. Estimated cost, $77,850.

Fla., St. Augustine—Bids will be received until Jan. 4 by I. I. Moody, Chn., Comrs. of St. Johns County, for paving King St. from San Sebastian Bridge to Horn Rd. with brick.

Miss., Gulfport—Board of Supervisors of Harrison County contemplates $200,000 bond issue for boulevard along sea front.

Miss., Jackson—Bids will be received by W. W. Downing, Chancery Clk., until Jan. 4 for surfacing about 5 miles of road.

Tenn., Columbia—City Council will improve West Seventh, Garden and Railroad St. with asphaltic concrete.

Tenn., Columbia—Maury County Highway Commissioners will build road from Hampshire to County line, about 3 miles.

Tenn., Jonesboro—Citizens voted $425,000 bonds for road construction. Noted Nov. 18.

Tenn., Murfreesboro—Citizens defeated $175,000 bonds to purchase and maintain turnpikes. Noted Sept. 30 and Nov. 4.

Tenn., Nashville—City Commissioners appropriated $146,130 for paving in 1916. W. W. Southgate, City Engr.

Ky., Somerset—Citizens of Pulaski County defeated $300,000 bonds for roads. Noted Sept. 16.

Ohio, Akron—Plans will be prepared for repaving Exchange St. from East Market St. to Portage Path.

Ohio, Akron—Commissioners of Summit County contemplate an expenditure of $372,000 for road work next year.

Ohio, Cleveland—Commissioners of Cuyahoga County will pave West Lake Rd. next spring. Estimated cost, $200,000.

Ohio, Independence—(Official)—Bids will be received by Arthur J. Goudy, Village Clk., until noon, Jan. 8, for sidewalks on Brecksville Rd. between Station No. 178 and 230.

Ind., Columbia City—Bids will be received until 2:30 p.m., Feb. 9, by T. A. McLaughlin, Audr., Comrs. of Whitley County, for road on line between Whitley and Noble Counties.

Ind., Columbia City—Bids will be received by T. A. McLaughlin, Audr., Comrs. of Whitley County, until 1 p.m., Feb. 9, for three gravel roads in Smith Township.

Ind., Ft. Wayne—(Official)—Bids will be received by Board of Park Commissioners of City of Ft. Wayne until 4 p.m., Jan. 17, for improving Rudisill Blvd. from west property line of Piqua Ave. to east property line of Broadway.

Ill., Dixon—Accordirg to press reports plans are being considered for $750,000 bond issue for road improvements.

Ill., Galena—City plans to pave a number of streets next spring.

Ill., Galena—Election will be held in Kane County next spring to vote on $1,500,000 bonds for State-aid highways.

Ill., Ottawa—Board of Supervisors of La Salle County contemplate $500,000 bond issue for road work.

Ill., Peoria—Board of Local Improvements plans to pave Elm St. between Adams St. and Reed Ave. with brick. Estimated cost, $6,051.

Wis., Washburn—Plans being prepared for street improvements during 1916.

Iowa, Clinton—Bids will be received by city until Jan. 11 for paving seven blocks in downtown district with brick. Estimated cost, $53,678.

Minn., Carlton—Bids will be received by A. R. Norman, County Audr., until 10 a.m., Jan. 7, for State Rural Highway No. 11. Estimated cost, $32,885. C. D. Conkey, Engr.

Minn., St. Paul—(Official)—Bids will be received by A. Hohenstein, Pur. Agt., until 10:30 a.m., Jan. 3, for grading and improving Osceola Ave. from Lexington Ave. to Dunlap St.

Neb., Omaha—Plans approved by City Commissioners for boulevard from Fontelle to Miller Parks.

Mo., Kansas City—According to press reports movement is on foot to rocksurface the Osage Valley Highway between Kansas City and Springfield.

Mo., Mountain Grove—Bonds for $45,000 voted by citizens for road work.

Mo., Platte City—Board of Supervisors of Platte County plans bond issue for 139 miles of rock roads.

Mo., St. Louis—Bids will be received by E. R. Kinsey, Pres., Bd. of Pub. Ser., until noon, Jan. 7, for grading Taylor Ave. from Broadway to Florisant Ave.

Ark., Waldron—Surveys will be made by State Highway Department, Little Rock, for road from Waldron to Coaldale, 22 miles.

Tex., Dallas—O. H. Lang, City Comr., will submit plan to citizens for paving all streets of city. Estimated cost, $7,500,000.

Tex., Denison—Bids will be received by Commissioners of Grayson County until Jan. 12 for improving highway system. Estimated cost, $1,150,000, of which $900,000 is now available. J. C. Field & Co., 105 Field Bldg., Consult. Engr.

Tex., El Paso—Commissioners of El Paso County contemplate an expenditure of between $100,000 and $125,000 for improving Upper Valley Rd.

Tex., Graham—Citizens of Graham District defeated $35,000 bonds for road improvements.

Tex., Grand Saline—Election will be held Jan. 10 to vote on $16,000 bonds for street improvements.

Tex., La Grange—Election will be held in Fayette County, Commissioners Precinct to vote on bonds for 70 miles of road, Schulenberg portion of National Highway. J. C. Baumgarten, Pres.

Tex., Lockhart—Election will be held Jan. 22 to vote on $50,000 bonds for highway construction. Noted Dec. 9.

Tex., Lufkin—Election will be held Feb. 26 in Angelina County, Lufkin Precinct, to vote on $200,000 bonds for road construction.

Tex., Sulphur Springs—Citizens voted $100,000 bonds for road improvements in Precinct No. 1. Noted Nov. 18.

Wash., Seattle—Bids will be received until Jan. 11 by Commissioners of King County for road from Hazelwood to Newport, part of Permanent Highway No. 13. Estimated cost, $25,000.

Wash., Seattle—Bids will be received until Jan. 16 by Commissioners of King County for Permanent Highway No. 12.

Wash., Walla Walla—City contemplates expenditure of between $75,000 and $100,000 for paving various streets next year.

Ore., Astoria—Bids will be received about Jan. 1 for paving Commercial St.

Ore., Portland—City Council plans to improve East 29th St. from Belmont to East Stark St. and East Washington St. from East 29th to East 31st St.

Bids In and Contracts Awarded

Mass., Boston—(Braintree)—Contract for road in Barnstable Township, Braintree, awarded to THOMAS & MURPHY, Middleboro, at $9,839.

N. Y., New York—(Borough of Manhattan)—(Official)—Bids were received Dec. 20 for repairing asphalt pavement on marginal streets and piers, North, East and Harlem Rivers, about 13,000 sq.yd., as follows: Uvalde Asphalt Paving Co., $1.34 per sq.yd.; Barber Asphalt Paving Co., $1.375 per sq.yd.; Sicilian Asphalt Paving Co., $1.38 per sq.yd. Noted Dec. 16.

N. Y., New York—(Borough of Manhattan)—(Official)—Bids were received Dec. 21 for wood-block pavement in team gangway and wagon way spaces of municipal ferryboat

"Mayor Gaynor," from Franklin Contracting Co., 52 Vanderbilt Ave., New York, at $2,800, and Richard Lamb, at $3,520. Noted Dec. 16.

N. Y., New York—(Borough of Manhattan)—(Official)—Bids were received Dec. 21 for wood-block pavement in team gangway and wagon way spaces of municipal ferryboats "Bayridge," "Gowanus" and "Nassau," from Franklin Contracting Co., 52 Vanderbilt Ave., New York, at $12,700, and Richard Lamb, at $16,737. Noted Dec. 16.

N. Y., New York—(Borough of Manhattan)—(Official)—Bids were received Dec. 21 for wood-block pavement in team gangway and wagon way spaces of municipal ferryboats "Manhattan," "Brooklyn," "Queens," "Bronx" and "Richmond," from Franklin Contracting Co., 52 Vanderbilt Ave., New York, at $15,400, and Richard Lamb, at $18,799. Noted Dec. 16.

N. J., Jersey City—Contract for improving Newark Turnpike awarded to WILLIAM BAKER, INC., at $480,000.

Md., Baltimore—Contract for paving Pratt St. from Linwood Ave. to east city limits awarded to BALTIMORE ASPHALT BLOCK AND TILE CO., Monroe and Lorman St., Baltimore. Noted Dec. 16.

N. C., Lincolnton—Contract for paving Main St. and constructing 20 blocks of sidewalks awarded to NOLL CONSTRUCTION CO., Chattanooga, Tenn.

Fla., Jacksonville—Contract for paving awarded to H. H. ENBODY, Aurora, Ill. Estimated cost, $40,000.

Fla., Tarpon Springs—Contract for constructing sidewalks awarded to SOUTHERN CONCRETE AND CONSTRUCTION CO., Tarpon Springs and St. Petersburg.

Ohio, Cleveland Heights—(Warrensville post office)—Contract for grading and flagging South Woodland Rd. awarded to J. W. CHAPMAN, 1653 Ridgefield Rd., Cleveland. Estimated cost, $25,176.

Ind., Anderson—Commissioners of Madison County awarded contract for four gravel roads to RAYMOND STEPHENS, at $2,120, $2,150, $6,300 and $3,575, respectively; two gravel roads to MADISON CONSTRUCTION CO., at $2,000 and $1,349, respectively. Noted Nov. 25.

Ill., Rock Island—Contract for paving Eighth Ave., and 24th and 29th St. awarded to McCARTHY IMPROVEMENT CO. Estimated cost, $15,052. Noted Dec. 16.

Tex., Clarksville—Contract for system of highways including bridges, culverts, etc., for Road District No. 1, Red River County, awarded to TEXAS NATIONAL CONSTRUCTION CO., Clarksville. Estimated cost, $300,000. J. R. Johnson, Engr. Noted Dec. 2.

Tex., Dallas—Contract for paving Bishop Ave. from Jefferson to Davis St. awarded to STANDARD ENGINEERING AND CONSTRUCTION CO., at $18,023.

Tex., Liberty—N. A. DAWSON, San Antonio, at $25,000, awarded contract for gravel highway on road from Liberty to Livingston.

Tex., San Saba—San Saba County Commissioners awarded contract for constructing and improving sand-clay roads to HORACE H. SHELTON, San Antonio. Estimated cost, $50,000.

Okla., Muskogee—Contract for road improvements in Muskogee County awarded to H. B. WILSON, at $8,000. J. B. Clonts, County Engr. Noted Nov. 11 and Dec. 16.

Wash., Olympia—Contract awarded to S. G. KINDER, Bridgeport, at $7,568 for surfacing with gravel 12 miles of Sunset Highway, Wenatchee northerly.

Wash., Olympia—Contracts for highway work awarded as follows: G. L. STICKLER, Davenport, $23,887, for 8¾ miles, Inland Empire Highway Pullman South; H. L. WILSON CO., Walla Walla, $16,945, for 11½ miles, Inland Empire Highway Kennewick West, Kiona to Richland; G. L. STICKLER, Davenport, $22,639, for 9½ miles, Inland Empire Highway Walla Walla West, Touchet to Wallula; GENERAL CONSTRUCTION CO., Spokane, $21,646, for 9 miles, Insland Empire Highway Rosalia to Oakesdale. Noted Dec. 2.

Wash., Seattle—Vahlbusch-Holmes Co., 2332 First Ave., Seattle, at $13,980, submitted lowest bid for grading Rainier Ave. A. H. Dimock, City Engr.

Ore., Portland—Oregon Hassam Paving Co., at $7,512, low bidder for paving Summit Drive District with hassam, and Manning & Co., at $7,672, for concrete.

INDUSTRIAL WORKS

Proposed Work

Mass., Malden—Commonwealth Acid Phosphate Co. has purchased a site in Wellington District, Malden, on which it plans to construct a plant. Henry C. Sawyer, 53 State St., Boston, Agent.

Mass., Wellington—(Boston post office)—Commonwealth Acid Phosphate Co., recently organized, will build plant. Estimated cost, $250,000. Willard Welsh, 15 Exchange St., Boston, interested.

Conn., New Milford—Press reports state that bleachery to be known as Robertson Bleachery will be constructed at New Milford. Estimated cost, $800,000.

N. Y., Amsterdam—A. V. Morris & Son, Ft. Johnson, plans to rebuild plant at Amsterdam which was recently destroyed by fire with a loss of $100,000.

N. Y., Elmira—Plans being prepared for additions to plant of Fold-Easyhouse Manufacturing Corporation, recently incorporated with $250,000 capital stock. M. C. P. Parker, Pres.

N. Y., New York—(Borough of Brooklyn)—Plans being prepared by John C. Wandell for two-story, 40x100-ft. garage on 40th St. for W. R. Thomas. Estimated cost, $15,000.

N. Y., New York—(Borough of Queens)—(Official)—We have been informed that S. Sugar, 600 West 181st St., New York (Borough of Manhattan), is Arch. for proposed two-story factory for H. W. Beyer & Co., 507 West 50th St., New York, and not National Fireproofing Co., 949 Broadway, New York, as stated in our issue of Dec. 9.

N. Y., New York—(Borough of Queens)—Bids will soon be received by William Higginson, Arch., 13 Park Row (Borough of Manhattan), for 100x364-ft. factory and garage near Nott Ave., Long Island City, for Degnon Realty and Terminal Improvement Co., to be occupied by Rome Manufacturing Co., 149 Broadway, New York.

N. Y., Niagara Falls—Hooker Electrochemical Co. will build addition to plant. Estimated cost, $1,000,000.

N. Y., Niagara Falls—International Acheson Graphite Co. will build addition to plant. Estimated cost, $100,000. W. Acheson Smith, Gen. Mgr.

N. Y., Schenectady—General Electric Co. will construct addition to its plant. Estimated cost, $25,000.

N. J., Jersey City—Joseph Dixon Crucible Co. will erect four-story, 100x150-ft. addition to plant on Monmouth St. Estimated cost, $50,000.

N. J., Jersey City—Plans being prepared by William G. Massarebe, 15 East 40th St., New York, N. Y., for rebuilding six-story, 40x60-ft. factory on Sherman Ave. for Gylmann Realty Co., to be occupied by Alaska Chemical Co. Estimated cost, $30,000.

N. J., Trenton—Robert C. Maxwell Co. purchased site on East State St. and will build plant.

N. J., West Hoboken—Nairn Linoleum Co., Kearney, will build factory at West Hoboken. Estimated cost, $30,000.

Penn., Philadelphia—Plans prepared by Ballinger & Perrott, Arch., Philadelphia, for four-story factory, oxidizing building and two-story pump house for George W. Blabob Co., Philadelphia.

Penn., Philadelphia—Cover & Co. will build five-story ware house at 244 North Third St.

Penn., Philadelphia—Olney Ice Manufacturing and Cold Storage Co. will build plant at Duncannon and Mascher St. Peuckert & Wunder, 310 Chestnut St., Philadelphia, Arch.

Penn., Philadelphia—Plans prepared for four-story, 40x150-ft. warehouse at Front and Federal St. for Pennsylvania R.R. Co. A. C. Shand, Philadelphia, Ch. Engr.

Penn., Philadelphia—Pennsylvania Taximeter Cab Co. plans to build 10-story concrete garage on South Broad St. Estimated cost, $300,000.

Penn., Uniontown—Pennsylvania R.R. Co. will build freight house, warehouse and new yards. Estimated cost, $240,000.

Md., Baltimore—Board of Estimate contemplates building asphalt plant. Estimated cost, $20,000.

W. Va., Clarksburg—Sunnyside Orchard Co., recently incorporated with $80,000 capital stock, plans to build large canning plant on Reynolds Farm on Fairmont-Clarksburg Interurban Traction line.

W. Va., Wheeling—J. E. Moss Iron Works Co. will build addition. Estimated cost, $10,000.

N. C., Winston-Salem—P. H. Hanes Knitting Co. will build four or five-story addition to mill.

Ga., Columbus—Eagle & Phoenix Mills contemplates expenditure of $75,000 for enlarging its mills.

Fla., Jacksonville—Commodores Point Terminal Co. plans to build large wharf warehouse. A. G. Cummer and J. P. Taliaferro, interested.

Tenn., Chattanooga—Tennessee Stove Works contemplates addition. Estimated cost, $50,000.

Tenn., Knoxville—Southern Ry. will build and equip 73x480-ft. steel car-repair shed, 51x100-ft. workshop, 48,000 gal. tank for water supply, 37x92-ft. reclaiming shed, 52x400-ft. scrap dock, 32x100-ft. lumber shed at Coster Shops. Estimated cost, $200,000. W. H. Wells, Washington, D. C., Ch. Engr. Constr.

Tenn., Nashville—Tennessee Extract Co. will construct plant. Estimated cost, $250,000.

Tenn., Nonconnah—(Memphis post office)—Reported that Illinois Central R.R. contemplates building steel car plant. Estimated cost, $1,000,000.

Ky., Ashland—Ashland Steel, Iron and Mining Co. will build plant. Estimated cost, $1,000,000.

Ky., Ashland—United Gas and Fuel Co. will construct plant for purification of oils, manufacture of gasoline and production of petroleum byproducts. Estimated cost, $100,000.

Ohio, Akron—Crandall-Morgan Hardware Co. plans to construct warehouse at Cuyahoga Falls Ave. and Bewin St. Estimated cost, $10,000.

Ohio, Cincinnati—American Tool Works will build plant on Eggleston Ave. Estimated cost, $250,000.

Ohio, Cincinnati—John Steptoe Shaper Co. will build two-story, 65x85-ft. addition to plant on Colerain Ave. Anthony Kunz, Arch.

Ohio, Cleveland—Allyne-Ryan Foundry Co. will construct two additions to its plant at Aetna Rd. and East 91st St. Estimated cost, $15,000.

Ohio, Cleveland—Plans being prepared by E. F. Gibbons, Arch., 1900 Euclid Ave., Cleveland, for two-story addition to plant of Independent Towel and Supply Co., 1820 Central Ave. Estimated cost, $20,000.

Ohio, Cleveland—Richardson & Yost, Arch., 354 Rockefeller Bldg., preparing plans for factory at East 49th St. and Superior Ave. for National Telephone Supply Co. Estimated cost, $50,000.

Ohio, Cleveland—Plans prepared by George S. Rider & Co., Engr., 512 Century Bldg., Cleveland, for two four-story, 160x350-ft. and 143x512-ft. factories for Properties Co. O. M. Stafford, Pres. Noted Dec. 9.

Ohio, Cleveland—Rickerson Manufacturing Co., 912 Schofield Bldg., will build factory at Ottawa and Jones Rd. Estimated cost, $10,000.

Ohio, Hamilton—Chicago & Illinois Western R.R. contemplates roundhouse. W. B. Clark, Chicago, Ill., Pres. and Gen. Mgr.

Ohio, Norwood—United States Playing Card Co. will build four-story, 32x60-ft. addition to plant. Samuel Hannaford & Son, Cincinnati, Arch.

Ohio, Springfield—Plans prepared by W. H. Russ, Arch., Indianapolis, Ind., for four-story, 300x300-ft. addition to plant of Robbins & Myers Co. Estimated cost, $150,000. Noted Dec. 16.

Ind., Indianapolis—Centennial Building Co. will build garage at 10th and Meridian St. Estimated cost, $21,000.

Ind., Indianapolis—Link-Belt Co. will build addition to plant at Addison St. and Vandalia R.R. Estimated cost, $12,000.

Mich., Alpena—Michigan Alkali-Huron Portland Cement Co. will build 125x287-ft. addition to plant.

Mich., Detroit—Stroh Brewing Co. will build two-story reinforced-concrete ice plant on Columbia Ave. Estimated cost, $20,000.

Mich., Highland Park—Ford Motor Co., Detroit, will build addition to plant at Highland Park. Estimated cost, $1,000,000. Frank L. Klingensmith, Detroit, Vice-Pres.

Ill., Chicago—American Cocoa Nut Butter Co. will build three-story addition to plant at 2528 West 18th St. Estimated cost, $18,000. R. G. Pierce, Arch.

Ill., Chicago—H. H. Hanks Co., 4708 West 12th St., will build three-story grain elevator. Estimated cost, $12,000. D. S. Penticost, 127 North Dearborn St., Chicago, Arch.

Ill., Chicago—H. M. Hoyt, 22 Grove St. will build four-story printing plant. Estimated cost, $200,000. S. H. Corwen, 4511 Vinsens Ave., Chicago, Arch.

Ill., Chicago—Western Plumbing Supply Co., 3214-24 Fillmore St., will construct one-story warehouse. Estimated cost, $10,000.

Ill., Chicago—C. Wright, Muskegon, Mich., will build garage at 4868 North Clark St., Chicago. Estimated cost, $26,000. I. C. Saxe, 127 North Dearborn St., Chicago, Arch.

Wis., Fond du Lac—Bids will soon be received by J. E. Hannen, Arch., 74 South Main St., Fond du Lac, for two-story, 73x74x132-ft. garage and machine shop for J. W. Watson. Estimated cost, $15,000.

Wis., Kenosha—Thomas B. Jeffrey Co., manufacturer of automobiles, plans to construct two additions to its plant.

Wis., Manitowoc—Bids will soon be received by Juul & Sixta, Arch., Imig Bldg., Sheboygan, Wis., for two-story, 50x115-ft. garage and machine shop for H. W. Hagen & Co.

Wis., Milwaukee—Plans being prepared by Raulf Construction Co., Patton Bldg., Milwaukee, for 80x500-ft. foundry for Electric Steel Casting Co.

Minn., Minneapolis—Bardwell-Robinson Co. will build four-story, 50x150-ft. addition to plant at Second and 24th St. Estimated cost, $50,000. L. J. Bardwell, Secy.

Minn., Minneapolis—Plans being prepared by Kees & Colburn, Arch., for 12-story factory and warehouse at Fourth and First St. for Wyman, Partridge & Co. Estimated cost, $300,000.

Neb., Omaha—Omaha Ice and Cold Storage Co. plans to construct plant at 23d and Boyd St. Estimated cost, $85,000.

Mont., Billings—Yellowstone Packing Co., recently incorporated with capital of $300,000, will build packing plant. J. B. Henderson, Chinook, J. E. Jurtz and J. G. Hers, Billings, interested.

Mo., Kansas City—Kansas City Tire and Rubber Corporation will construct factory in Kansas City. P. E. Werner, Akron, Ohio, Vice-Pres. and Gen. Mgr.

Mo., St. Joseph—Standard Oil Co. contemplates factory and warehouse at Eighth and Monterer St. Estimated cost, $125,000.

Mo., St. Louis—Bids will be received about Jan. 1 by Barnette, Haynes & Barnette, Arch., Century Bldg., St. Louis, for eight-story building for Pulitzer Publishing Co., 212 North Broadway. Estimated cost, $200,000. Noted Dec. 16.

Tex., Dallas—Reported that Nelson Morris & Co., Chicago, Ill., contemplates packing plant at Dallas. Estimated cost, $75,000.

Tex., El Paso—Krakauer, Zork & Moye's Successors, Inc., will build 90x120-ft., three-story addition to plant. Estimated cost, $50,000. Trost & Trost, El Paso, Arch.

Tex., Marshall—Plans prepared for shops for Texas & Pacific Ry. C. H. Chamberlin, Dallas, Ch. Engr. Noted Oct. 28.

Okla., Blackwell—Planet Oil Co. will establish oil refinery. J. J. Brown, Jr., Box 813, Blackwell, Engr.

Colo., Denver—Ford Motor Co. will build four-story, 128x130-ft. addition to assembling plant. Estimated cost, $150,000. Charles Hendy, Jr., Local Mgr.

Idaho, Twin Falls—Amalgamated Sugar Co. plans to construct sugar factory at Twin Falls. L. R. Eccles, Mgr.

Wash., Northport—Northport Smelting and Refining Co. plans to build addition to smelting plant. Estimated cost, $200,000.

Wash., Seattle—Contract will soon be awarded for four-story, Class A warehouse at Juneau and Atlantic St. for Oregon-Washington R.R. and Navigation Co. to be occupied by American Paper Co. Estimated cost, $100,000. Noted Dec. 16.

Ore., Oregon City—Plans being prepared for reinforced-concrete addition to plant of Hawley Pulp and Paper Co. Estimated cost, $500,000. W. P. Hawley, Sr., Pres. Noted Dec. 23.

Ore., Portland—Studebaker Corporation of America plans to build eight-story reinforced-concrete building. A. L. Sumption, Portland, Mgr.

Calif., Los Angeles—Van Vorst & Berman Co., 1332 East Sixth St., will build three- or four-story, 80x200-ft. factory.

Que., Cap Magdeleine—Union Bag and Paper Co., New York, N. Y., will construct print and sulphide mill at Cap Magdeleine.

Que., Montreal—Steel Co. of Canada, 1272 Notre Dame St., W., will build addition to plant. Estimated cost, $25,000.

Ont., Arnprior—McLachlin Bros. will build addition to plant. Estimated cost, $500,000. G. H. Johnson, Engr.

Ont., Listowel—Plans being prepared for factory for F. W. Hay Shoe Co. Estimated cost, $15,000.

Ont., London—Plans being prepared for addition to plant of Spramotor Co. Estimated cost, $40,000. W. H. Heard, Mgr.

Ont., Mafeking—Mutchenbacker Bros. will rebuild lumber mill. Estimated cost, $20,000.

Ont., Orillia—National Hardware Co., 95 Barrie Rd. W., will construct addition to its factory. Estimated cost, $20,000.

Ont., St. Thomas—Wabash R.R., St. Louis, Mo., plans to enlarge its roundhouse and extend its trackage at St. Thomas. T. J. Frier, St. Louis, Mo., Pur. Agt.

Man., Winnipeg—McLaughlin Carriage Co. will build three-story, 84x225-ft. addition to plant.

Bids in and Contracts Awarded

Mass., South Framingham—I. Levinstein & Co., Inc., 74 India St., Boston, awarded contract to C. A. DODGE CO. for four-story, 74x206-ft. oil plant. Estimated cost, $60,000.

Conn., Chester—C. J. Bates & Son awarded contract for two-story, 40x80-ft. factory to WILLIAM J. SEXTON CO., 84 Boulevard, Hartford.

Conn., Hartford—S. K. F. Ball Bearing Co., New York, N. Y., awarded contract to STONE & WEBSTER CORPORATION, Boston, Mass., for one-story, 75x300-ft. and two-story, 75x150-ft. plant.

Conn., Waterbury—American Brass Co. awarded contract for one-story factory to H. WALES LINES CO., Meriden. Estimated cost, $17,000.

N. Y., New York—(Borough of Brooklyn)—Contract for one-story, 69x100-ft. garage on Thomas St. for Adolf Goebel awarded to M. ARMENDINGER & SON, 1153 Myrtle Ave. Estimated cost, $15,000.

N. Y., New York—(Borough of Manhattan)—Contract awarded to D. C. WEEKS & SONS, 1123 Broadway, for reinforced-concrete factory at 581 Water St. for David Dows, 120 Broadway. Estimated cost, $120,000.

N. Y., Rochester—Rochester Lift Co. will construct factory at 348-350 Whitney St. by day labor. Estimated cost, $50,000.

N. Y., Rochester—Vacuum Oil Co., 904 Exchange St., will construct filter and tank building, kiln and addition to boiler house by day labor. Estimated cost, $60,000.

N. J., Newark—Contract awarded to FREDERICK KILGUS, 13 South Sixth St., Newark, for addition to factory at Dickerson and Hecker St. for Superior Ivory Button Co. Estimated cost, $40,000.

Penn., Contesville—Midvale Steel Co. awarded contract for additions to plant to IRWIN & LEIGHTON. Noted Dec. 23.

Penn., Milton—American Car and Foundry Co. awarded contract for 100x200-ft. brick plant to WALSH CONSTRUCTION CO., Albany, N. Y.

Penn., Monongahela—Stauffer Chemical Co. awarded contract for 70x100-ft. warehouse to GEORGE HOOG CO., Keystone Bldg., Pittsburgh.

Penn., Philadelphia—Contract awarded to TURNER CONCRETE STEEL CO., 1713 Sansom St., Philadelphia, for concrete work in connection with construction of factory at 23d and Market St. for Kahn & Greenberg. Estimated cost of factory, $75,000.

Penn., Philadelphia—Contract for three-story, 45x71-ft. reinforced-concrete factory at Edgemont and Clementine St. for E. Sutro & Sons Co. awarded to WILLIAM STEEL & SONS CO., 1600 Arch St., Philadelphia. Estimated cost, $18,000.

W. Va., Huntington—Contract for structural steel for one and two-story, 90x100-ft. bakery and office building for Stroehmann's Vienna Bakery awarded to J. E. MOSS IRON WORKS, Wheeling. Noted Nov. 18.

Ohio, Akron—Contract for factory at 1025 Sweitzer Ave. for Star Rubber Co. awarded to CARMICHAEL CONSTRUCTION CO., Akron. Estimated cost, $30,000.

Ohio, Cincinnati—Contract awarded to D. MEINKEN for six-story, 100x250-ft. factory on Spring Grove Ave. for Huenefeld Co. Estimated cost, $200,000. Noted Sept. 30.

Ohio, Cleveland—Chisholm-Moore Co., 5046 Hamilton Ave., awarded contract for three-story, 30x70-ft. addition to plant to GEORGE B. McMILLAN CONSTRUCTION CO., 1794 East 57th St., Cleveland.

Ohio, Cleveland—Frantz Premier Co., Cleveland, awarded contract for factory on Ivanhoe Rd. to SAMUEL AUSTIN & SON CONSTRUCTION CO., 14230 Euclid Ave., Cleveland. Estimated cost, $10,000.

Ohio, Cleveland—Stenaeward Realty Co. awarded contract to HENRY G. SLATMEYER CONSTRUCTION CO., 203 Lakeside Ave., Cleveland, for factory at 2108 Superior Viaduct. Estimated cost, $10,000.

Ind., Elkhart—Crow Motor Car Co. awarded contract to GRANT BUSHNELL for 60x240-ft. addition to plant. Estimated cost, $10,000.

Ind., Terre Haute—Indiana Coke and Gas Co. awarded contract for plant to GAS MACHINERY CO., Cleveland, Ohio Estimated cost, $700,000.

Ill., Chicago—(Official)—Contract for hog hair house for Armour & Co. awarded to WOERMAN CONSTRUCTION CO., Suite 543, Century Bldg., St. Louis, Mo.

Ill., Chicago—Joseph Downey awarded contract for three-story warehouse at 2251 South Michigan Ave. to STRESENREUTER BROS. Estimated cost, $45,000.

Ill., Chicago—Evening American Publishing Co. awarded contract for two-story warehouse to WIEBOLT CONSTRUCTION CO. Estimated cost, $75,000.

Ill., Chicago—McAvoy Brewing Co. awarded contract for three-story warehouse at 2339 South Park Ave. to LEYDEN ORTSEIFER CO. Estimated cost, $20,000.

Ill., Chicago—Contract awarded to O. W. ROSENTHAL CO. for two-story addition to plant of Regensteiner Colortype Co., 310 South Racine Ave. Estimated cost, $25,000.

Wis., Eau Claire—Contract for substructure of one-story, 60x250-ft. plant for Gillette Safety Tire Co. awarded to CAST STONE CONSTRUCTION CO., Eau Claire.

Wis., Manitowoc—Aluminum Goods Manufacturing Co. awarded general contract for five-story, 55x300-ft. factory to WALTER W. OEFLEIN, North Milwaukee, Wis. Estimated cost, $100,000. Noted Nov. 25.

Wis., Milwaukee—Contract awarded to WILLIAM WINTER, 1025 Second St., Milwaukee, for two-story, 25x40-ft. addition to bakery of Atlas Bread Co.

Wis., Milwaukee—Contract awarded to MEREDITH BROS. CO., 1042 Kinnikinnic Ave., Milwaukee, for factory and power plant for Newport Mining Co., 1112 First National Bank Bldg. Estimated cost, $100,000. E. G. Wilmer, Secy.

Minn., Minneapolis—Contract for plant for Western States Coke Co. awarded to KOPPERS BROS., Pittsburgh. Estimated cost, $2,000,000. Noted Nov. 11.

Wash., Seattle—Contract awarded to KIEL & WHIPPLE, Central Bldg., Seattle, at $32,867 for four-story addition to warehouse on Whatcom Ave. for Commission of Port of Seattle. Noted Dec. 23.

Ore., Portland—Contract for two-story garage and service plant on Davis St. to be occupied by Pacific Kissel Car Co., awarded to BEERS CONSTRUCTION CO., Portland. Estimated cost, $25,000. Sutton & Whitney, Arch.

Calif., Norwalk—(Official)—Bids received Dec. 13 for laundry for Norwalk State Hospital from L. G. Bergren & Son, $14,672; G. A. Daniels, $15,750; J. Harnish Co., $16,947.

Ont., Kingston—Angrove Bros. awarded contract for garage to KINGSTON CONSTRUCTION CO., Kingston. Estimated cost, $10,000.

FEDERAL GOVERNMENT WORK

Proposed Work

N. Y., Buffalo—Buildings—Plans and specifications for lock houses and other buildings to be constructed on U. S. Ship Canal Lock at Black Rock Harbor have been forwarded to Washington for approval by Maj. Frazier, U. S. Engr.

N. J., Trenton—Completing Delaware River Channel—Appropriation of $65,000 recommended by Government Engineers for completing Delaware River channel from Lalor St. to Pennsylvania R.R. bridge.

N. C., New Berne—Building—Bids will be received at Office of Depot Quartermaster, U. S. Army, Washington, D. C., until 11 a.m., Jan. 24, for reconstructing lodge at U. S. National Cemetery, New Berne.

Fla., Miami — Canal — Government Engineers preparing plans for enlargement of East Coast Canal.

La., New Orleans—Levee—Mississippi River Commission contemplates repairing levees on Mississippi River below New Orleans. Estimated cost, $750,000.

Iowa, Washington—Post Office—Bids will be received by James A. Wetmore, Act. Superv. Arch., Treasury Dept., Washington, D. C., until 3 p.m., Jan. 28, for U. S. post office at Washington.

Mont., Ft. Keogh—Electric Lighting System—Bids will be received at Office of Depot Quartermaster, Ft. Keogh, until 10 a.m., Jan. 15, for furnishing and installing electric-lighting system.

Bids In and Contracts Awarded

Mass., Attleboro—Post Office—Bids were received Dec. 21 for U. S. post office at Attleboro, (a) limestone, (b) sandstone, as follows: Charles McCaul Co., Philadelphia, Penn., (a) $86,875, (b) $91,875; King Lumber Co., Charlottesville, Va., (a) $81,475, (b) $90,000; W. H. Fissel & Co., New York, N. Y., (a) $85,800, (b) $90,000. Noted Nov. 18.

D. C., Washington—Dredging—Bids were received Dec. 18 at U. S. Engineer Office for dredging in Anacostia River, (a) Section 1, (b) Section 2, as follows: Bowers Southern Hydraulic Dredging Co., Galveston, Tex., (a) 8c., (b) 5c.; Maryland Dredging and Contracting Co., Baltimore, Md., (a) 5.5c., (b) 5.5c.; Sanford & Brooks, Baltimore, Md., (a) 6.45c., (b) 4.95c. Noted Dec. 9.

Tenn., Humboldt—Post Office—Bids were received Dec. 20 for U. S. post office at Humboldt as follows: Algernon Blair, Montgomery, Ala., $39,656; F. F. Beggs, Scottsburg, Ind., $41,136; George Becking, Chattanooga, Tenn. $41,323. Noted Nov. 11.

Ohio, Cleveland—Dredging—Contract for dredging in Cleveland Harbor awarded to GREAT LAKES DREDGE AND DOCK CO., Williamson Bldg., Cleveland, at $60,000. Noted Nov. 4 and Dec. 2.

Ohio, Middletown—Post Office—Bids were received Dec. 18 for U. S. post office at Middletown, (a) limestone, (b) sandstone, as follows: George W. Stiles Construction Co., Chicago, Ill., (a) $69,132, (b) $76,132; Charles McCaul Co., Philadelphia, Penn., (a) $69,340, (b) $76,340; Roche-Brunner Building Co., Cincinnati, (a) $71,700, (b) $78,600. Noted Nov. 11.

Neb., Aurora—Post Office—Bids were received Dec. 22 for U. S. post office at Aurora as follows: A. W. Lane, 19 South La Salle St., Chicago, Ill., $43,512; G. W. Stiles Construction Co., Chicago, Ill., $45,325; W. D. Lovell, 1415 Eighth St., S. E., Minneapolis, Minn., $45,247. Noted Nov. 18.

Tex., Ft. Bliss—Annex to Hospital—Bids received Nov. 27 for rear annex to hospital at Ft. Bliss from Mayfield & Shaw, El Paso, $14,157; Jennings & Woods, El Paso, $15,689; Buchanan & Gilder, El Paso, $16,254. Noted Nov. 4.

CANALS—DITCHES—IRRIGATION

Proposed Work

Ind., Scottsburg—Ditch—Petition filed in Scott Circuit Court for ditch, 25 miles long, which will pass through Scott, Jackson and Washington Counties.

Ill., Urbana—Drainage—Bids will be received until 11 a.m., Jan. 10, by Joseph P. Gulick, Attorney of Two Mile Slough Drainage District for drainage work in Branch No. 23, of Two Mile Slough Drainage District.

Minn., Duluth—Ditch—Bids will be received until Jan. 7 by County Auditor for Ditch No. 5 Estimated cost, $150,000. Noted Nov. 11.

Minn., Fairmont—Ditches—Martin County will build three drainage ditches Estimated cost, $200,000. H. C. Nolte, County Audr.

Minn., Jackson—Ditch—Contract will soon be awarded for Judicial Ditch No. 35. Estimated cost, $76,647. P. D. McKeller, County Audr.

Minn., Jackson—Ditches—Surveys being made for Judicial Ditches Nos. 38, 41 to 48 inclusive, 50 to 54 inclusive, and 61. P. D. McKeller, County Audr.

Minn., Mankato—Ditches—Surveys completed for Judicial Ditches Nos. 6, 7, 8, 9 and 10. Estimated cost, $80,000, $15,000, $35,000, $35,000 and $15,000 respectively. Roy H. Allison, County Engr., Blue Earth County, Mankato.

Minn., Mankato—Ditch—Surveys being made for Judicial Ditch No. 11, in Blue Earth County. Estimated cost, $125,000. Roy H. Allison, County Engr., Mankato.

Minn., Mankato—Ditch—Surveys made for County Ditch No. 42. Estimated cost, $20,000. Roy H. Allison, County Engr., Mankato.

Minn., Marshall—Ditches—Surveys being made for County Ditches Nos. 11, 12, 20, 21, 22 and 23. Estimated cost between $300,000 and $400,000. E. Sheppard, County Audr.

Minn., New Ulm—Ditches—New surveys being made for County Ditches Nos. 5, 8 and 11, about 72 miles. Surveys being made for Ditches Nos. 28, 29, 30, 31 and 33. Estimated cost, $300,000. F. D. Minium, County Surv.

Minn., Worthington—Ditch—Surveys completed for Judicial Ditch No. 1. Estimated cost, $39,850. Gustave Swanberg, Worthington, County Audr.

Minn., Worthington—Ditch—Surveys being made for Judicial Ditch No. 2. Estimated cost, $25,000. G. Swanberg, Worthington, County Audr.

Kan., Salina—Drainage—Contract will soon be awarded for drainage work in District No. 1. Estimated cost, $12,000. H. B. Walker, Manhattan, State Drainage Engr. Noted Dec. 9.

Mo., Memphis—Drainage—Bids will be received until 2 p.m., Jan. 15, by Earl McDaniel, Secy., Wyacanda River Drainage District No. 1, for 17.3 miles of drainage ditch. C. J. Wiegner, Memphis, Engr.

Tex., Mission—Irrigation—Mission Canal Co. recently sold to Bankers' Trust Co., reorganized under name of United Irrigation Co., with capital of $500,000, and will extend canal system to irrigate larger tract of land.

Colo., Pueblo—Ditches—Directors of Neposta Ditch and Reservoir Association appropriated between $60,000 and $75,000 for improving ditches and reservoirs during 1916.

N. M., Santa Fé—Irrigation—Charles Hutchins, Kansas City, Mo., granted application by James A. French, State Engr., for irrigation pumping plant on Pecos River.

N. M., Springer—Irrigation Dam—Rayado Colonization Co. will raise dam 30 ft. in order to irrigate land.

Idaho, Caldwell—Drainage—U. S. Reclamation Service and Nampa-Caldwell Irrigation District will build drainage system.

Ariz., Palomas—Irrigation—S. H. Woodruff and associates, Los Angeles, Calif., plan to utilize underflow of Gila River by irrigating about 14,000 acres of land.

Wash., Tacoma—Dredging—Plans being prepared by Commissioners of Waterway District No. 1, for dredging and filling Hylebos Creek tide flats. Bids will be received in January. Estimated cost between $350,000 and $400,000. D. B. Roben, 3019 South 11th St., Tacoma, Project Engr.

Ore., Oregon City—Drainage—Linn County Drainage Congress contemplates forming several drainage districts, first being Oak Creek District, 30,000 acres being included in watershed which it plans to drain.

Ore., Prineville—Irrigation—Plans being considered for irrigation of 46,000 acres near Haystack, 9,000 acres near Prineville, North Land Unit, Deschutes Project, by storage of water of Crooked River.

Calif., Los Angeles—Irrigation—Contract will soon be awarded for irrigating 77,000 acres in San Fernando Valley by Board of Supervisors. Noted Nov. 18.

Calif., Oakdale—Irrigation—Bids will be received until Jan. 17 by Oakdale Irrigation District for irrigation work. Estimated cost, $20,000.

Calif., Sacramento—Canal—Surveys will be made for tidewater canal from Sacramento to San Francisco Bay. Estimated cost, $1,000,000. W. F. McClure, State Engr.

Calif., Sacramento—Irrigation—T. G. Patten, E. R. Walker and associates applied to Federal Government for right-of-way across lands in Eldorado and Amador Counties to divert water from Mokelumne River to irrigate 40,000 acres in Sacramento County.

Bids In and Contracts Awarded

N. Y., New York—(Borough of Manhattan)—Dredging—Contract awarded to P. SANFORD ROSS, INC., 277 Washington St., Jersey City, N. J., at $0.30 per cu.yd., for dredging North River from 103d to 109th St., 33,000 cu.yd. Noted Dec. 23.

N. Y. New York—(Borough of Manhattan)—(Official)—Dredging—Bids received Dec. 20 by R. A. C. Smith, Comr. of Docks, for dredging, Contract No. 1497, (a) North River, 150,000 cu.yd., (b) East and Harlem Rivers, 45,000 cu.yd., Boroughs of Manhattan, Bronx, Queens, Brooklyn and Richmond, as follows: Henry Du Bois Sons Co., 17 State St., (a) $0.1295 per cu.yd.; Coastwise Dredging Co., 17 Battery Pl., (a) $0.147, (b) $0.237; P. Sanford Ross, Inc., (a) $0.176, (b) $0.358. Noted Dec. 16.

Penn., Philadelphia—Dredging—Only bid received Dec. 20 by Department of Docks, Wharves and Ferries, for dredging Frankford Creek was from American Dredging Co., at $0.293 per cu.yd.

Ind., Portland—Ditch—E. A. Erwin, Greenville, Ohio, at $22,348 submitted lowest bid for John F. Warren et al Ditch in Jay and Randolph Counties.

Minn., Mankato—(Official)—Ditch—Contract for County Ditch No. 41 awarded to MINNESOTA PIPE AND TILE CO., Mankato, at $8,592. Noted Dec. 16.

Minn., Warroad—Ditch—Contract for Ditch No. 62 awarded to E. G. BRANDENBURG CONSTRUCTION CO., 730 Temple Court, Minneapolis.

Ark., Marion—Ditches—Fred C. Morgan, Indianapolis, Ind., at 7.415c. per cu.yd. submitted lowest bid for approximately 50 miles of ditches for Drainage District No. 7, Crittenden County. Morgan Engineering Co., Memphis, Tenn., Engr. Noted Nov. 25.

Tex., Corpus Christi—Drainage—Robstown Drainage District awarded contract to J. B. ARPIN CONSTRUCTION CO., Houston, at $141,375 for drainage of 80,000 acres. Noted Nov. 25.

Calif., Eureka—Ditch—Contract awarded to CHAPMAN & CO., Klamath Falls, Ore., for ditch 10 miles long for Butte Valley Land Co., Macdoel.

MISCELLANEOUS

Proposed Work

Maine, Bath—Elimination of Grade Crossing—Abolition of grade crossing of Maine Central R.R. approved by Public Utilities Commission, Augusta. Estimated cost, $18,000. B. T. Wheeler, Portland, Ch. Engr.

N. Y., New York—(Borough of Manhattan)—(Official)—Cement, etc.—Bids will be received by Marcus M. Marks, Borough Pres., until 2 p.m., Jan. 3, for furnishing and delivering 500 tons of portland cement, 3,000 tons limestone dust, 7,000 cu.yd. binder stone, 15,000 cu.yd. asphalt wearing surface sand and 2,000 tons refined asphalt.

N. Y., New York—(Borough of Manhattan)—(Official)—Fence—Bids will be received by Cabot Ward, Pres. of Park Bd., Municipal Bldg., until 3 p.m., Jan. 6, for w.-i. fence and setting of artificial granite gate posts around Morningside Park. Noted Aug. 12 and 26.

N. Y., Syracuse—Elimination of Grade Crossings—Syracuse Grade Crossing Commission having plans prepared for elimination of grade crossings in city.

N. J., East Orange—Elimination of Grade Crossings—George F. Swain, Consult. Engr., Boston, Mass., retained by city to prepare plans for elimination of grade crossings along line of Lackawanna R.R.

N. J., Englewood—Ferry House and Slip—Plans being prepared for two-story ferry house and slip at foot of Palisade Ave. for Dyckman St. and Englewood Ferry Corporation, care of Brooklyn and Manhattan Ferry Corporation. Estimated cost, $50,000.

N. J., Jersey City—Park—Hudson County Board of Freeholders appropriated $500,000 to purchase Suckley Estate and improve same for park.

N. J., Morris Plains—Fire House—Bids will soon be received for addition to fire house for New Jersey State Hospital for Insane. Estimated cost, $10,000.

N. J., Wildwood—Pier—Casino Pier Co. will build pier. Heber Crane, Pres.

Penn., Philadelphia—Fire Station—Plans being prepared by City Arch. for fire station at Montgomery and Girard St. Estimated cost, $20,000. George S. Webster, City Engr.

Va., Newport News—Marine Railway—O. A. Bloxom, Battery Park, contemplates building marine railway and oyster-shucking plant.

Miss., Gulfport—Park—City will issue $125,000 bonds for purchasing and improving land for park. George M. Foote, Mayor.

Tenn., Knoxville—Parks—Election will be held Jan. 29 to vote on $50,000 bonds for parks.

Tenn., Waverly—City Commissioners of Nashville plan to build fire house in Waverly. G. J. Tompkins, Comr. of Fire Dept.

Ill., Chicago—Fire Engine House—City will build fire engine house at 4426 North Kedzie Ave. Estimated cost, $19,000. C. W. Kallal, Arch.

Wis., Superior—Dock—Reported that plans will be prepared for replacing ore dock No. 3 at Allouez Bay for Great Northern Ry. during winter of 1916 and 1917. Estimated cost, $1,000,000. A. H. Hogeland, St. Paul, Minn., Ch. Engr.

Wis., West Allis—Grandstand—Plans prepared by Alfred C. Clas, Arch., 520 Colby-Abbot Bldg., Milwaukee, for two sections of concrete grandstand in State Fair Park for State Department of Agriculture. Estimated cost, $50,000. C. P. Norgord, Madison, Comr.

Wis., West Allis—Park Buildings—Plans prepared by Alfred C. Clas, Arch., 520 Colby-Abbot Bldg., Milwaukee, for 100x150-ft. swine and sheep barn in State Fair Park for State Department of Agriculture. C. P. Norgord, Madison, Comr. Estimated cost, $44,000.

Minn., St. Paul—Marble Balustrade and Steps—Bids will be received until 10:30 a.m., Jan. 10, by A. Hohenstein, Pur. Agt., for marble balustrade and steps about the St. Paul Library.

Mo., St. Louis—(Official)—River Terminals—Bids will be received in spring for seven-story, 100x250-ft. river terminal and warehouse for St. Louis River Front and Dock Association. Estimated cost, $250,000. J. L. Wees, 419 Commercial Bldg., St. Louis, Arch. Noted Dec. 16.

Ark., Bridge Junction—(Hopewell post office)—Levee Work—St. Francis Levee Board petitioned River and Harbor Committee of Congress to seek government aid for levee work from Pecan Point to Bledsoe, 76 miles. H. D. Tomlinson, Pres.

Wash., Tacoma—Improving White and Puyallup Rivers—William S. Mitchell and M. Gardner, United States Government Engrs., retained by Inter-County River Improvement Board to review and pass on work done on improvements along White and Puyallup Rivers and to make suggestions.

Calif., Los Angeles—Elimination of Grade Crossings—City Board of Public Utilities approved plans of Pacific Electric Ry. Co. for elevating tracks from station at Sixth and Main St. to San Pedro St. and for terminal improvements. Estimated cost, $300,000. Noted Nov. 11.

Calif., Los Angeles—Subway—Plans being prepared for rearranging tracks at Hill St. Station preliminary to building subway under Olive St., west of station, about 6 miles. Estimated cost rearranging tracks, $40,000; subway, $12,000,000. Noted Nov. 18.

Calif., Manhattan—Pier—Board of Trustees contemplates constructing pleasure pier at Center St. and pavilion at Martin Ave. Estimated cost, $70,000 and $20,000 respectively.

Calif., San Francisco—Automatic Sprinklers—Board of Public Works considering installation automatic sprinklers in city car barns. Estimated cost, $54,000. Frederick J. Churchill, Secy., Bd. of Pub. Wks.

Calif., Santa Monica—Wharf—Santa Monica Land Co. contemplates building wharf, 560-ft. long and 24-ft. wide, at Santa Monica Cañon.

Que., Montreal—Comfort Stations—Plans prepared for three comfort stations at Chaboillez, d'Armes and Dominion Sq. for city. Estimated cost, $5,000, $8,000 and $10,000 respectively. A. Chausse, Arch., City Hall.

Que., Sherbrooke—Subway—City Council contemplates constructing subway in Richelieu St. Estimated cost, $10,411. E. C. Gatien, Clk.

Ont., Port Stanley—Comfort Stations—London & Port Stanley Ry. contemplates construction of four comfort stations. William Spittal, Secy.

MISCELLANEOUS

Bids In and Contracts Awarded

N. Y., Cold Spring Harbor—(Official)—Retaining Walls—Contract for reinforced-concrete foundations and retaining walls for residence of Otto H. Kahn awarded to STEWART ENGINEERING CORPORATION, 17 Battery Pl., New York, at $150,000.

N. Y., New York—(Borough of Brooklyn)—(Official)—Steel Tank—Contract for steel tank and fittings for storage of liquid asphalt at municipal asphalt plant, Seventh St. and Gowanus Canal awarded to P. P. FARLEY, 103 Park Ave., New York, at $5,335. Noted Dec. 16.

N. Y., New York—(Borough of Manhattan)—(Official)—Market—Bids received Dec. 20 by Marcus M. Marks, Borough Pres., for market under Queensborough Bridge, 59th and 60th St., First Ave. and Ave A, from A. W. King, 1511 Bryant Ave., $13,955; W. F. Plass & Bros., 145 West 18th St., $14,850; Thomas J. Waters Co., 271 West 125th St., $14,900. Noted Dec. 16.

N. J., Stonecharbor—Jetties—Contract for bulkhead and jetties for ocean front protection awarded to HILL DREDGING CO., Atlantic City, at $192,414. Noted Sept. 9.

Penn., Philadelphia—Coal Pockets—Contract awarded to C. P. BOWER, Roberts and Wayne Ave., Philadelphia, at $76,130, for coal pockets on Emerald St. for Philadelphia & Reading Ry. Co. Noted Nov. 25.

Penn., Philadelphia—Elevated Railway Work—Bids received Dec. 14 by A. M. Taylor, Dir. Dept. of City Transit, for steel superstructure and appurtenant work for two-track elevated railway in Frankford Ave. from Unity to Dyre St., under Contract No. 519, from American Bridge Co., $249,000; McClintic-Marshall Co., $263,000; Phoenix Bridge Co., $269,800. Noted Nov. 18.

Penn., Philadelphia—Pier—Contract for superstructure of Pier No. 78 at foot of McKean St. awarded to SNARE & TRIEST, Woolworth Bldg., New York, N. Y., at $488,600. Noted Nov. 25 and Dec. 9.

Del., Claymont—Pier—General Chemical Co., Marcus Hook, Penn., awarded contract for pier to JOHN MONKS & SONS, 82 Beaver St., New York, N. Y. Estimated cost, $200,000.

Fla., Daytona—Pavilion—Contract for 150x150-ft. pavilion with about 40-ft. extending over river for C. G. Burgoyne, awarded to JACOB ESPEDAHL, Daytona. Estimated cost, $10,000. Noted Dec. 23.

Ohio, Cleveland—Grading Subway—Contract for grading subway at Hamilton Ave. and Pennsylvania R.R. awarded to J. UDELSON, 2410 East 49th St., Cleveland. Noted Nov. 25.

Ind., Indianapolis—Track Elevation—Bids received Dec. 15 by Board of Public Works for removal of bridge and construction of traffic ways under Vandalia R.R. in connection with track elevation from O'Hogan & Lake Co., Chicago, Ill., Sections H, J, K and M, $43,890; Marsh, Cleary & White Co., Chicago, Ill., Sections H, J, K and M, $47,499; Walsh Construction Co., Cleveland, Ohio, Sections H, J, K and M, $46,000; Dunn-McCarthy Co., Chicago, Ill., Sections H, I, J, K, L and M, $53,659.

Kan., Leavenworth—Riprapping River Bank—Chicago, Burlington & Quincy R.R. awarded contract for willows to be used in riprapping river bank to WARREN HOUSER, Weston. Estimated cost, $75,000.

BUILDINGS

Other items relative to Building Construction will be found under the following headings: "Industrial Works;" "Federal Government Work" and "Miscellaneous."

Proposed Work

Mass., Beverly—School Committee will submit proposition to City Council for building high school on City Home site near Cedar St. Estimated cost, $300,000.

Mass., Brookline—Plans prepared for three-story addition to high school. Estimated cost, $125,000. Andrews, Jacques & Rantoul, 50 Congress St., Boston, Arch. Noted Oct. 28 and Aug. 12.

Mass., Westfield—Plans being prepared by C. A. Tinker, Arch., 318 Main St., Springfield, for two-story theater for Goldstein Bros. Estimated cost, $60,000.

Mass., Westfield—Plans being prepared by M. B. Harding, Arch., Westfield, for one-story, 116x178-ft. school. Estimated cost, $50,000. J. M. Dutton, Chn. School Bd. Noted Oct. 21.

R. I., Pawtucket—Pawtucket and Central Falls Aerie of Eagles plan to build home.

N. Y., Binghamton—Plans being prepared for five-story bank and office building for People's Trust Co. Estimated cost, $50,000. E. W. Dickerman, Perry Bldg., Arch.

N. Y., Medina—Board of Education contemplates building schools. Estimated cost, $135,000.

N. Y., Rochester—Plans being prepared by Hutchinson & Cutler, Cutler Bldg., Rochester, for eight-story, 33x110-ft. medical building on Chestnut St. for F. L. Greene & Co., 33 Exchange St. Estimated cost, $75,000.

N. Y., Rochester—Plans being prepared by Foster & Gade, Arch., Sibley Bldg., for three-story building for Home for Friendless. Estimated cost, $200,000. A. M. Lindsey, 250 Main St., E., Pres., Bd. of Dir.

N. J., Newark—City will erect memorial building at Camp and Broad St. Estimated cost, $1,500,000. Thomas L. Raymond, Mayor.

Penn., Allentown—(Official)—We have been informed that Louis E. Jallade, 37 Liberty St., New York, N. Y., is Arch. for six-story addition to Y. M. C. A. building and Ruhe & Lange, Allentown, Assoc. Arch. Estimated cost, $100,000. Noted Dec. 16.

Penn., Braddock—Plans will be prepared by W. W. Williams, Arch., Magee Bldg., Pittsburgh, for church and rectory for S. S. Mary and Paul Church. Estimated cost, $75,000.

Penn., Loretto—St. Francis College plans to build seminary and faculty building. Estimated cost, $50,000. G. Puderbaugh, Hutchinson Bldg., Altoona, Arch.

Penn., Ogontz—Plans being prepared by H. Trumbauer, Arch., Land Title Bldg., Philadelphia, for private school for A. A. Sutherland. Estimated cost, $100,000.

Md., Baltimore—Plans being prepared by Otto G. Simonson, Arch., Maryland Casualty Tower, Baltimore, for 10-story hotel at Light and German St. for Southern Hotel Co.

Md., Baltimore—Revised plans being prepared by J. Evans Sperry, Arch., 409 Calvert Bldg., Baltimore, for six-story building at Park Ave. and Franklin St. for Y. W. C. A. Estimated cost, $200,000. Isabel Harmon, Secy.

D. C., Washington—Plans being prepared by Thomas W. Lamb, Arch., 644 Eighth Ave., New York, N. Y., for two-story, 132x153-ft. theater at 12th and F St. for Marcus Loew, 1493 Broadway, New York, N. Y.

D. C., Washington—Plans being prepared for 10 buildings at Wisconsin Ave. and Davis St. for National School of Domestic Art and Science. M. A. Zurhorst, 1753 Rhode Island Ave., Washington, Principal.

Va., Atlee—Bids will be received until noon Jan. 15, by Board of School Trustees, Henry District, Hanover County, for school. Charles M. Robinson, Inc., 508 Times-Dispatch Bldg., Richmond, Arch.

W. Va., Charleston—W. P. Ginther, Arch., 416 Everett Bldg., Akron, Ohio, preparing plans for three-story addition to St. Francis Hospital. Estimated cost, $40,000.

W. Va., Huntington—Boone County Land Co. will construct store and hotel building. Estimated cost, $40,000.

W. Va., Huntington—Marshall College will erect physical education building. C. I. Woodley, Pres.

W. Va., Morgantown—West Virginia University will build additions to institution. Estimated cost, $75,000.

W. Va., Moundsville—St. Xavier's Congregation plans one-story, 60x90-ft. church and rectory. Estimated cost, $40,000.

W. Va., Point Pleasant—Plans being prepared by H. R. Warner, Capitol St., Charleston, for remodeling hotel into bank, hotel, lodge and store building for Spencer Hotel Co. J. S. Spencer, interested.

W. Va., Wheeling—Plans prepared for 10-story, 50x115-ft. bank, store and office building for Security Trust Co. Estimated cost, $250,000. E. B. Franzheim and F. F. Faris, Schmulbach Bldg., Wheeling, Associate Arch.

W. Va., Wheeling—Plans being prepared by F. F. Faris, Arch., 420 Schmulbach Bldg., Wheeling, for two-story church for Trinity Lutheran Congregation. Estimated cost, $40,000.

N. C., Durham—Citizens voted $75,000 bonds for two schools on Moorehead School site. G. W. Watts, Chn. School Trustees. Noted Oct. 21 and Nov. 18.

N. C., Kinston—Reported that Atlantic Coast Line R.R. and Southern R.R. contemplate building union station. J. E. Willoughby, Wilmington, Ch. Engr., Atlantic Coast Line R.R.

N. C., Rocky Mount—J. C. Mount, Rocky Mount, prepared plans for bank building at 144 South Main St. for Rocky Mount Savings and Trust Co.

S. C., Greenville—A permanent Exposition Building will be constructed by Southern Textile Association. Estimated cost, $50,000.

S. C., Rock Hill—Congregation of First Baptist Church plans to construct three-story edifice. Estimated cost, $40,000.

Ga., Macon—Curran R. Ellis, Arch., Macon, retained by Board of Education to prepare plans for Vineville School. Estimated cost, $40,000.

Ala., Hamilton—Sixth School District plans to build school. Estimated cost, $465,000.

Ala., Seminole—J. B. Wiggins, H. C. Maley and E. E. Bucham, Chicago, Ill., will build club house at Seminole. J. C. Pollock, Gen. Mgr.

Miss., Biloxi—Plans being considered by Biloxi Lodge, Loyal Order of Moose, for new building. F. J. Weiss, Chn. of Bldg. Com.

Miss., Clarksdale—Board of Supervisors contemplates remodeling court house. J. W. Cutler and Charles W. Clark, interested.

Miss., Gulfport—Plans being prepared by Nolan & Torre, Arch., New Orleans, La., for two-story hospital for Kings Daughters. Estimated cost, $40,000.

Miss., Marion—Election will be held Jan. 4 to vote on $100,000 bonds for agricultural high school. Noted Oct. 28.

Tenn., Chattanooga—Volunteer State Life Insurance Co. will build 10-story office building. Estimated cost, $415,000. Barnwell & Barnwell, Arch.

Tenn., Memphis—Plans being considered by city and county for tuberculosis hospital.

Tenn., Memphis—Baptist Memorial Hospital will construct addition. Estimated cost, $125,000.

Tenn., Morristown—Contract will soon be awarded for building for First National Bank. Estimated cost, $50,000. James R. Forgey, Pres.

Ky., Paducah—City contemplates $600,000 bond issue for schools and sewers.

Ohio, Akron—Press reports state that State will construct armory and auditorium. Estimated cost, $100,000. B. L. Barger, Secy. of State Armory Bd.

Ohio, Akron—M. O'Neil, West Market St., plans to build clubhouse to be occupied by Akron City Club Co. Estimated cost, $50,000. S. F. Ziloxi, 69 Edgerton Rd., Pres.

Ohio, Akron—Bids will be received by J. F. Barnhart, Clk., Bd. of Education, Central High School, until noon, Jan. 5, for additions to Miller and Portage Path Schools.

Ohio, Akron—Board of Education plans to construct two-story school to be known as Robinson School. Estimated cost, $50,000. J. F. Barnhart, Central High School, Clk.

Ohio, Bellaire—Baltimore & Ohio Railroad Co. will build freight station at Bellaire.

Ohio, Canton—W. E. Koltz, Vice-Pres. Canton Drop Forge Co., is interested in a project to build motion-picture theater at Market Ave. and Second St. Estimated cost, $65,000.

Ohio, Lebanon—Election will soon be held to vote on $65,000 bonds for courthouse for Warren County.

Ohio, Mt. Vernon—William A. Ashbrook, Congressman, introduced bill which calls for appropriation of $100,000 for public building.

Ohio, Newburg—(Cleveland post office)—Revised plans prepared by W. J. Carter, Arch., Illuminating Bldg., Cleveland, for four-story temple for Newburg Masonic Temple Co. Estimated cost, $60,000. Noted under Cleveland, Ohio, Dec. 23.

Ohio, Salem—Independent Hose Co. will build club house at Salem.

Ohio, Wilmington—Bids will soon be received for three-story courthouse and jail for Clinton County. Estimated cost, $300,000. Weber, Werner & Adkins, 1206 Mercantile Library Bldg., Cincinnati, Arch. Noted Dec. 2.

Ohio, Youngstown—Plans will be prepared by H. Lyman Ford, Arch., 206 Hippodrome Arcade, Youngstown, for two-story store and apartment building on Wick Ave. Estimated cost, $70,000.

Ohio, Zanesville—Municipal Committee of Chamber of Commerce contemplates city hall and market. Estimated cost, $100,000. H. C. Van Voorhis, Chn. of Com.

Ind., Elkhart—B. Haynes, Lunger Bldg., plans four-story, 70x85-ft. office building at Marion and Second St. Estimated cost, $40,000. Ellwood & Ellwood, South Main St., Elkhart, Arch.

Ind., Hammond—All Saints Congregation contemplates church. Estimated cost, $150,000.

Ind., Indianapolis—Contract will soon be awarded for four-story bank and office building for Meyer & Kiser Bank. D. A. Bohlen & Son, 1012 Majestic Bldg., Arch. Noted Dec. 9.

Ind., Michigan City—Bids will be received about Jan. 17 by Worthman & Steinbach and C. L. Pointek, Archs., 1859 West Chicago Ave., Chicago, Ill., for edifice for St. Stanislaus Church. Estimated cost, $100,000.

Ind., South Bend—Plans being prepared by E. L. Tilton, Arch., 32 Broadway, New York, N. Y. (Borough of Manhattan), for library for Notre Dame University. Estimated cost, $150,000.

Mich., Ann Arbor—Trustees of University of Michigan plan to build library. Estimated cost, $350,000.

Mich., Detroit—Y. W. C. A. will construct building at East Adams Ave. and Witherell St. Estimated cost, $250,000.

Mich., Flint—Preliminary plans prepared by Starrett & Van Vleck, Arch., 8 West 40th St., New York, N. Y., for six-story bank and office building for First National Bank.

Mich., Flint—Malcomson & Higgenbotham, Arch., Detroit, will prepare plans for two schools for Board of Education.

Mich., Pontiac—Press reports state that a moving picture and vaudeville theater will be constructed on site of Hotel Wenonah on South Saginaw St. Estimated cost, $70,000.

Ill., Chicago—Plans being prepared by Holsman & Hunt, 332 South Michigan Ave., for five-story hotel for A. B. Mulvey. Estimated cost, $150,000.

Wis., Milwaukee—Milwaukee Athletic Club will build home at Mason St. and Broadway. Estimated cost, $300,000.

Wis., Portage—Board of Education considering plans to construct central school or two individual schools, one on east side and one on west side.

Wis., Waukesha—Citizens defeated $120,000 bonds for schools. G. B. Harris, Pres.

Wis., West Allis—Board of Education plans to build high school next year. G. Mahoney, Secy.

Iowa, Audubon—Election will soon be held to vote on bonds for school.

Iowa, Belmond—Preliminary plans prepared by G. L. Lockhart, Arch., Endicott Bldg., St. Paul, Minn., for high and grade school. Estimated cost, $70,000. A. Fitts, Belmond, Secy., Bd. of Education.

Iowa, Waterloo—Citizens voted $250,000 bonds for high school. W. H. Brunn, Secy., Bd. of Education. Noted Nov. 25.

Iowa, Waukon—Plans will be prepared by Charles A. Dieman Co., Arch., 405 Granby Bldg., Cedar Rapids, for school. Estimated cost, $60,000.

Kan., Caldwell—Bids will soon be received for two-story school. Estimated cost, $50,000. S. S. Voigt, 411 Barnes Bldg., Wichita, Arch., and J. E. Damon, Caldwell, Secy., Bd. of Education.

Kan., Emporia—College of Emporia contemplates new building. Estimated cost, $100,000. W. A. White, Chn.

Neb., North Platte—Bids will be received about Feb. 15 for high school. Estimated cost, $50,000. Bert M. Reynolds, North Platte, Arch. Noted Dec. 23.

Mont., Billings—Billings Labor Unions will construct three-story, 50x140-ft. building. Estimated cost, $70,000. H. Anderson, Chn. Bldg. Com. Dedrick & Piper, Billings, Arch.

Mo., St. Louis—E. C. Simmons will construct building to be occupied by Franklin Bank. Estimated cost, $125,000. Guy C. Mariner, St. Louis, Arch.

Tex., Brownsville—Citizens voted $100,000 bonds for purchasing site and building high and ward schools for Brownsville Industrial School District. Noted Nov. 25.

Tex., El Paso—Plans prepared by Trost & Trost, Arch., for two-story building for H. R. O. Realty Co., St. Louis. Estimated cost, $45,000.

Tex., Marshall—Election will be held Jan. 18 to vote on $60,000 bonds for schools.

Okla., Alva—Citizens voted $90,000 bonds for high school. Noted Nov. 18.

Okla., Chickasha—Citizens voted $70,000 bonds for school for Board of Education.

Ariz., Prescott—Yavapal County will build two-story courthouse. Estimated cost, $200,000. R. T. Belcher, Clk., Bd. of Superv.

Ariz., Safford—Plans being prepared by Lescher & Kibbey, Arch., Phoenix, for two-story, 60x82-ft. courthouse for Graham County. Estimated cost, $45,000.

Calif., Bakersfield—(Official)—Citizens voted $75,000 bonds for two schools. James Egan, Secy., School Com. Noted Dec. 9.

Bids in and Contracts Awarded

Mass., Belmont—Contract for high school awarded to LEIGHTON-MITCHELL CO., 95 Milk St., Boston, at $84,000.

Mass., Marlboro—School Committee awarded contract for school on Washington St. to THOMAS P. HURLEY, Marlboro, at $40,487. Noted Sept. 23.

Mass., Salem—George T. O'Brien, 10 Palmer St., Cambridge, at $61,659, submitted lowest bid for addition to Bowditch School. Noted Dec. 9 and 16.

Mass., Springfield—Contract awarded to ERNEST F. CARLSON CO., Springfield, for theater, garage, bowling alleys and billiard room for Russell C. Parsons.

N. Y., New York—(Borough of Manhattan)—Contract awarded to LEVIN BROS., 320 Fifth Ave., for one-story, 53x93-ft. synagogue for Wel Israel Anshe Poland Congregation. Estimated cost, $75,000.

N. Y., New York—(Borough of Manhattan)—Contract for nine-story nurses home and 70x72-ft. superintendent's house on Lexington Ave. for German Hospital and Dispensary awarded to A. A. SMITH, 69 East 91st St.

N. J., Jersey City—Contract for a theater for the National Theater Co., 1326 St. Nicholas Ave., New York, N. Y., awarded to WELLS CONSTRUCTION CO., 235 Fifth Ave., New York, N. Y. Estimated cost, $65,000.

Penn., Philadelphia—(Official)—Contract awarded to MELODY & KEATING, 1218 Chestnut St., Philadelphia, at $227,918, for 31-room school at B and Allegheny Ave. and nine-room addition to school at 70th and Woodland Ave. Noted Dec. 9.

Ohio, Akron—Contract for Jennings School awarded to DAWSON CONSTRUCTION CO., Columbus. Estimated cost, $70,000. Noted Dec. 2.

Ohio, Athens—Contract for church and Sunday school for First Christian Church awarded to B. DAVIDSON, 152 North Congress St., Athens. Estimated cost, $40,000. Noted Nov. 18.

Ohio, Cincinnati—(Official)—Contract for Industrial Arts Building, tunnel K, power house, stadium, gymnasium and tunnel J, of Eastside High School awarded to ROUCHE-BRUNNER CO., Cincinnati, at $390,700. Noted Dec. 2.

Ohio, Cleveland—County Commissioners awarded contract for detention home on Franklin Ave. to WILLIAM MOORE & CO., at $59,990. Noted Nov. 4.

Ind., Culver—Contract for armory awarded to JAMES I. BARNES, Logansport.

Mich., St. Joseph—Contract for high school awarded to F. H. BEAUMAN CO., at $75,977. Noted Dec. 23.

Wis., Madison—T. C. McCARTHY, 848 Jeunifer St., Madison, at $49,249, awarded contract for Agricultural Soils Bldg., for University of Wisconsin. M. E. McCaffery, Secy.

Wis., Madison—Contract for physics building for University of Wisconsin awarded to WISCONSIN CONSTRUCTION CO., Chippewa Falls. Estimated cost, $200,000. M. E. McCaffery, Secy.

Iowa, Alton—(Official)—Contract for school for Board of Education awarded to H. M. BOSMA, Sheldon. Noted Dec. 16.

MONT CLARE BRIDGE, PHOENIXVILLE, PENN.

Bids were received Dec. 21 by the Commissioners of Montgomery and Chester Counties for the construction of a reinforced-concrete bridge across the Schuylkill River between Phoenixville and Mont Clare from (A) T. L. Eyre, Philadelphia; (B) F. M. Talbot Co., New York, N. Y.; (C) Thomas Sheahan, Hagerstown, Md.; (D) E. W. Foley, New York, N. Y.; (E) Foster Construction Co., Newark, N. J.; (F) Ferro Concrete Co., Harrisburg; (G) Whittaker & Diehl, Harrisburg; (H) J. E. Bunting & Co., Flushing, N. Y.; (I) Day & Zimmerman, Philadelphia; (J) Ambler Davis Co., Philadelphia; (K) Mason, Hilton & Co., New York, N. Y.; (L) National Foundation and Engineering Co., Cleveland, Ohio; (M) Dravo Contracting Co., Pittsburgh; (N) William C. Evans, Ambler, Penn. The item bids were as follows:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Lump sum bid	$113,400	$85,376.61	$92,335	$98,776	$127,437	$99,439	$89,739	$108,000	$94,091	$80,894	$88,200	$108,080	$86,625	$84,027
1,200 cu.yd. foundation excavation, earth	4.20	3.90	3.00	7.00	.75	4.80	3.00	8.00	2.80	2.00	10.00	1.00	3.50	2.40
30 cu.yd. foundation excavation, rock	4.60	3.90	4.00	10.00	2.50	5.00	4.00	10.00	2.80	5.00	10.00	5.00	4.50	6.00
100 cu.yd. river dredging	.48	.50	2.00	1.00	1.00	3.00	3.00	1.00	25	2.00	2.50	1.00	.60	2.00
100 cu.yd. roadway grading	.48	.40	.75	1.00	1.00	1.00	.75	.60	30	.75	1.00	.40	.50	.90
1,400 lin.ft. hardwood piles	.36	.40	.70	.50	.75	1.00	.25	.60	25	1.00	.50	.38	.40	1.00
900 cu.yd. concrete piles	.94	2.20	2.20	1.50	1.75	3.00	.50	1.00	1.00	3.00	2.00	1.40	1.50	2.10
10 cu.yd. class "A" concrete	14.40	11.00	12.50	10.00	12.50	15.00	15.00	8.50	8.00	30.00	12.00	10.00	11.00	20.00
100 cu.yd. class "B" concrete	8.40	7.00	7.50	9.00	10.00	12.00	9.00	8.00	6.80	25.00	10.00	7.00	8.25	15.00
963 cu.yd. class "C" concrete	7.20	8.25	7.00	8.00	10.00	12.00	8.00	7.50	5.75	7.00	10.00	7.00	7.25	8.00
10 cu.yd. concrete in balustrade	24.00	25.00	27.00	20.00	24.00	25.00	30.00	20.00	15.00	45.00	20.00	32.00	23.00	40.00
250 lin.ft. bush hammered surface	.12	.07	.10	.06	.03	.70	.20	.20	.10	.50	.10	06	.05	.40
2,000 lin.ft. carbor. rubbed surface	.06	.05	.05	.05	.03	.15	.10	.10	.02½	.50	.05	.05	.02	.65
108 sq.ft. wood block pavement	3.60	2.20	2.00	3.00	2.50	2.00	1.75	2.60	2.65	2.25	2.00	2.50	2.80	3.70
292 sq.ft. metropolitan block pavement	3.00	1.90	2.50	3.00	2.15	4.00	1.50	3.35	1.90	2.10	2.00	2.50	2.30	2.30
108 sq.ft. standard amicsite pavement	3.72	1.50	2.50	3.00	1.65	2.00	1.50	3.25	1.60	1.50	2.00	4.50	2.30	1.40
292 sq.ft. Belgian or granite block	3.36	3.20	3.50	3.00	3.35	2.00	1.75	3.25	2.45	3.25	2.75	3.00	2.75	3.00
500 cu.yd. waterproofing	.10	.08	.15	.10	.20	.20	.15	.25	.12	.40	.25	.10	.16	.50
3,500 lb. reinforcing steel	.05	.03	.03½	.04	.03	.04	.05	.03½	.03½	.05	.05	.03½	.03	.06
240 lin.ft. curb protection bar	.24	.15	.20	.30	.15	.15	.20	.15	.10	.15	.15	.25	.15	.12
240 lin.ft. 6-duct t.c. conduit	.36	.50	.35	.50	.35	.50	.25	.50	.27	1.50	.35	1.25	.30	1.00
240 lin.ft. 2-duct t.c. conduit	.24	.30	.12	.20	.14	.20	.10	.20	.09	1.00	.15	.40	.10	.40
40 lin.ft. metal conduit	.24	.27	.20	.30	.20	.15	.15	.20	.15	.75	.25	.25	.15	.60
1,500 lin.ft. sidewalk and curb finish	.07	.05½	.05	.10	.10	.20	.07	.15	.05	.25	.05	.15	.03	.22
10 lin.ft. 4-in. terra cotta sewer pipe	.24	.20	.50	.50	1.00	.07	.10	.30	.08	.35	.20	.50	.10	.30
100 lin.ft. 8-in. terra cotta sewer pipe	.48	.40	.70	.75	.60	.15	.12½	.40	.16	.80	.25	.35	.15	.80
300 lin.ft. 12-in. terra cotta sewer pipe	.96	.70	1.00	1.50	1.00	.30	.25	.50	.25	1.50	.30	.60	.27	1.50
2 catch basins	36.00	13.00	10.00	25.00	16.50	20.00	15.00	30.00	35.00	50.00	15.00	20.00	25.00	30.00
2 bronze light fixtures	144.00	90.00	125.00	10.00	145.00	150.00	100.00	80.00	150.00	50.00	75.00	100.00	100.00	40.00
2 draw boxes	48.00	7.50	15.00	1.00	16.50	15.00	10.00	10.00	12.50	25.00	5.00	5.00	7.00	20.00
60 cu.yd. broken stone fill	3.36	1.80	2.00	3.00	2.25	1.50	2.00	2.00	2.00	2.50	2.00	2.30	2.90	2.50
Extended totals	$132,521	$104,866	$110,765	$122,369	$145,832	$126,620	$106,188	$132,174	$107,520	$103,252	$117,212	$123,527	$104,103	$106,011

RAPID TRANSIT SYSTEM, NEW YORK, N. Y.

Section 3, Route No. 8

Bids were received by the Public Service Commission Dec. 7 for constructing Section 3, Route No. 8, a part of Eastern District Subway, under East River from Manhattan at 14th St. to North Seventh St., Brooklyn, from (A) Booth & Flinn, Ltd., 17 Battery Pl., New York; (B) Holbrook, Cabot & Rollins Corporation; (C) Degnon Contracting Co.; (D) Arthur McMullen & Olaf Hoff. The item bids were as follows:

	A	B	C	D
1,400 cu.yd. earth excavation above mean high water	$20.00	$16.00	$7.00	$14.00
2,100 cu.yd. earth excavation below mean high water	20.00	6.40	10.00	14.00
100 cu.yd. earth excavation for sewers	10.00	5.00	6.00	7.00
14,400 cu.yd. earth excavation below mean high water for shafts	25.00	15.60	25.00	60.00
100 cu.yd. rock excavation for shafts	16.85	20.00	12.00	10.00
700 cu.yd. tunnel excavation (earth) above mean high water	20.00	11.48	20.50	15.00
103,500 cu.yd. tunnel excavation (earth) below mean high water	19.40	11.48	20.50	28.00
46,200 cu.yd. tunnel excavation (rock)	19.40	14.50	25.00	31.00
8,400 cu.yd. tunnel excavation (earth and rock)	19.40	33.75	30.00	34.00
42,300 cu.yd. concrete	9.00	14.00	12.00	10.00
1,000 cu.yd. concrete placed in compressed air	15.00	16.75	18.00	20.00
10 cu.yd. rubble stone masonry	3.50	4.00	8.00	4.00
10 cu.yd. dry rubble masonry	2.50	2.50	7.00	4.00
2,400 cu.yd. dry stone packing	2.50	5.00	4.00	3.00
15 cu.yd. brick masonry	12.00	15.00	16.00	15.00
50 cu.yd. hollow terra cotta brick or tile masonry	12.00	15.00	16.00	15.00
12,000 bbl. Portland cement grout	3.50	5.00	2.50	3.50
56,000 bbl. natural cement grout	3.00	4.50	2.00	3.25
3,000 lin.ft. timber piles	.50	.50	.50	.40
100 cu.yd. broken stone or gravel	2.00	1.50	2.00	2.00
2,000 sq.yd. waterproofing 1-ply	.50	.35	.40	.50
100 sq.yd. waterproofing 2-ply	.80	.50	.50	.75
100 sq.yd. waterproofing 3-ply	1.10	.75	.75	1.00
100 sq.yd. waterproofing 4-ply	1.40	1.00	1.10	1.25
100 sq.yd. waterproofing 5-ply	1.70	1.25	1.50	1.50
100 sq.yd. waterproofing 6-ply	2.00	1.50	2.00	1.75
100 sq.yd. waterproofing dry ply	.30	.25	.40	.25
600 sq.yd. waterproofing laid in compressed air	4.00	6.50	3.00	5.00
370 cu.yd. brick laid in asphalt mastic	30.00	25.00	35.00	25.00
100 lin.ft. vitrified pipe, 12 in	.80	.70	.80	1.00
100 lin.ft. vitrified pipe, 10 in	.60	.65	.55	.80
100 lin.ft. vitrified pipe, 8 in	.50	.55	.40	.65
100 lin.ft. vitrified pipe, 6 in	.40	.50	.25	.50
100 lin.ft. vitrified pipe, 4 in	.30	.45	.20	.40
50 lin.ft. c.i. pipe, 6 in	.60	.70	1.00	1.10
100 lin.ft. c.i. pipe, 4 in	.45	.65	.75	.90
50 lin.ft. c.i. pipe, 3 in. extra heavy	.65	1.00	1.00	1.00
50 lin.ft. c.i. pipe, 4 in. extra heavy	.85	1.25	1.00	1.50
7,300 lin.ft. c.i. pipe, 6 in. extra heavy	2.00	1.50	1.20	2.00
500 lin.ft. c.i. pipe, 8 in. extra heavy	2.00	2.00	1.40	2.50
312,000 duct ft. tunnel ducts	.15	.15	.12	.12
70 ton riveted steel	100.00	80.00	90.00	80.00
1,820 ton steel for caissons	160.00	217.00	125.00	130.00
15 ton steel beams and shapes	100.00	140.00	90.00	70.00
15 ton steel rods and bars	50.00	140.00	60.00	80.00
43,500 ton c.i. tunnel lining	45.00	61.50	49.00	59.00
1,600 ton steel bolts and washers in lining	80.00	229.60	90.00	125.00
15 ton miscellaneous iron castings	55.00	60.00	80.00	70.00
1 ton miscellaneous iron furnishings for manholes and basin	75.00	50.00	80.00	70.00
1,000 lb. special wire forms	.15	.10	.10	.25
32,000 lin.ft. one and three-fourths in. hand-rail	.20	.25	.50	.25
660 sq.ft. steel gratings	1.40	1.00	1.25	1.50
50 sq.ft. vault lights	1.25	.80	1.50	2.00
275 sq.yd. restoration of sidewalks	2.00	2.00	2.00	1.50
190 sq.yd. restoration of granite block pavements	3.00	2.00	3.00	1.50
270 sq.yd. restoration of Belgian block pavements	3.25	2.50	2.00	1.50
200 lin.ft. new granite curb	1.00	1.50	2.00	1.00
100 sq.yd. new cement sidewalk	1.25	1.50	2.00	1.50
50 lin.ft. conduits, ½ in	.20	.10	.20	.20
50 lin.ft. conduits, 1 in	.25	.15	.30	.25
20 c.i. outlet boxes	.60	.70	1.00	1.00
100 lin.ft. 12-in. vitrified pipe sewer	1.50	2.50	2.50	1.00
100 lin.ft. 15-in. vitrified pipe sewer	2.00	3.00	3.00	1.25
1 ton c.i. pipe sewr—straight	60.00	45.00	60.00	50.00
1 ton c.i. pipe sewer—special	120.00	80.00	80.00	75.00
50 lin.ft. 3 ft., 6 in. x 2 ft., 4 in. egg sewer	5.00	4.50	8.00	6.00
100 lin.ft. 4 ft., 0 in. circular sewer	6.00	5.00	10.00	8.00
42 lin.ft. 6ft., 0 in., x 7 ft., 0 in., twin masonry sewer	40.00	24.00	30.00	50.00
Maintaining steam railroad (lump sum)	1,000.00	5,000.00	500.00	1,500.00
100 lin.ft. changin 6-in. c.i. water pipe in place	.50	.75	1.50	.50
100 lin.ft. changing 12-in. c.i. water pipe in place	1.00	2.25	2.50	.75
125 lin.ft. changing 6-in. c.i. gas pipe in place	1.00	1.15	1.25	.50
4 ton new c.i. straight pipe	50.00	40.00	50.00	50.00
300 lin.ft. new 6" w.i. gas pipe	2.00	1.50	1.50	1.50
2 ton new c.i. special pipe	110.00	50.00	80.00	60.00
600 lb. new malleable-iron fittings for new w.i. gas pipe	.15	.10	.05	.08
100 lin.ft. changing 3" wrought iron pipe	.30	1.00	1.00	.50
Engineering offices (lump sum)	30,000.00	10,000.00	10,000.00	6,000.00
Extended totals	$6,639,023	$6,907,762	$7,231,391	$9,466,560

Year's Crops—The final crop returns for the year, iss by the Department of Agriculture on Dec. 15, are not gre different from those already forecast, the changes be decreases in the quantities of corn, buckwheat and flaxs and gains in spring wheat, oats, rye, sweet potatoes, toba rice, hay, sugar beets and cotton from the estimates viously noted. Record yields are indicated of wheat a whole, oats, barley, rye, sweet potatoes, rice, hay and su beets, second best crops of corn, tobacco and apples, an a age crop of potatoes, and rather short yields of cotton flaxseed:

[Three figures omitted]

	Production 1915	Production 1914	Record Crop
Winter wheat	655,045	684,990	684,990
Spring wheat	356,460	206,027	330,348
All wheat	1,011,505	891,017	891,017
Corn	3,054,535	2,672,804	3,124,746
Oats	1,540,362	1,141,060	1,418,337
Barley	237,000	194,953	223,824
Rye	49,190	42,779	42,779
Buckwheat	15,769	16,881	22,792
Total, six cereals	5,908,361	4,959,494	5,723,495
White potatoes	359,108	409,921	420,647
Sweet potatoes	74,295	56,574	59,938
Tobacco, pounds	1,060,587	1,034,679	1,103,415
Flaxseed	13,845	13,749	29,285
Rice	28,947	23,649	25,744
Hay, tons	85,225	70,071	72,691
Sugar beets, tons	6,462	5,585	5,585
Cotton, bales	11,161	16,135	16,135
Apples, barrels	76,670	84,400	84,400

Perhaps the most notable illustration of the year's tende toward large yields is the showing above made of the ag gate yields of six leading cereals—wheat, corn, oats, ba rye and buckwheat—exceeding the aggregate of the record levels of the best of past years by 185,000,000, or per cent.

The values of the leading crops this year and last com as follows:

	1915	1914
Corn	$1,755,859,000	$1,722,070
Spring wheat	308,290,000	203,057
Winter wheat	622,012,000	675,623
All wheat	920,302,000	878,680
Oats	555,569,000	499,431
Barley	122,499,000	105,903
Rye	41,295,000	37,019
Buckwheat	12,408,000	12,893
Total	$3,417,932,000	$3,255,994
Flaxseed	$24,080,000	$17,318
Rice	26,212,000	21,849
White potatoes	221,104,000	199,469
Sweet potatoes	46,081,000	41,294
Hay	912,320,000	779,068
Tobacco	96,041,000	101,411
Cotton	602,393,000	525,324
Sugar beets	35,800,000	30,438
Apples	156,407,000	156,140
Total	$2,120,438,000	$1,872,302
Grand total, 15 crops	$5,538,370,000	$5,128,296

Only three crops, winter wheat, buckwheat and tobacco, s smaller values than a year ago. The six grain crops sho gain of 5 per cent. over 1914; the nine other crops show a of 13.2 per cent., and the fifteen crops together gained 8 cent. over last year. A notable increase in value is shown cotton, which, despite a 44 per cent. decrease in yield, sh a 14 per cent. gain in value.

Railway Communication Between India and Ceylon is posed by closing the present 20-mi. water gap with a causeway. The railways at both ends have been extended embankments and viaducts crossing the main part of strait at the head of the Gulf of Mannar. This includes navigation channel, at which there is a double-leaf Sche rolling-lift bascule bridge of 289-ft. span, as described "Engineering News," May 7, 1914. It is now proposed to b a causeway for the remaining 20 mi., service across w is maintained by ferry steamers. Of this distance 13 will be in shallow waterways between several islands a the line of what is known as Adam's Reef, the remai 7 mi. being on dry land across these islands. The la portions will be sand fills, protected by riprap of coral r For the causeway across the water two rows of reinfor concrete piles will be driven, 14 ft. apart, with the pile each row spaced 10 ft. c. to 3. They will be braced lo tudinally by arches and transversely by ties and struts of concrete. Behind the piles will be placed vertical s or panels, of reinforced concrete, the lower slabs being s well below the surface of the sand. When the slabs ar place, the inclosed space will be filled with sand. The level and the top of the concrete walls will be 6 ft. a high-water level. It is expected that this solid bank cause sand to accumulate on each side of it until it forms nucleus of a single island stretching across this part of strait.

Immigration and Emigration—Arrivals and departure certain races of aliens during the first 15 months of European war, August, 1914, to October, 1915, inclusive, given hereunder:

	Arrived	Departed	Cha
German	26,414	8,508	I. 1
French	22,464	13,026	I.
Russian	5,298	15,601	D. 1
English	73,394	63,335	I. 1
Irish	38,626	10,877	I. 2
Scotch	25,840	13,058	I. 1
Italians (south)	54,525	175,556	D. 12
Italians (north)	13,453	14,116	D.
Polish	6,718	5,617	I.
Hebrew	21,390	2,377	I. 1
Greek	22,676	14,879	I.

Engineering News

Volume 74, No. 27
Issued Every Thursday
Hill Publishing Company

NEW YORK, DECEMBER 30, 1915

Price, 15 Cents
Contents, First Page
Advertising Index, Last Page

PERIODICAL ROOM
RECEIVED
Engineering
DEC 31 1915
Library
UNIV. OF MICH.
LIBRARY

For Sale

Ideal Sites for Large Manufacturing Plants, Ship Yards, or Docks

850 Acres, 6 miles south of City Hall, Philadelphia

2½ miles shore front on Delaware River.

35-foot channel from the Sea to Philadelphia.

Easily developed R. R. Terminal.

Trolley to Philadelphia.

Will be sold as a whole or in tracts of not less than 200 acres.

Apply to

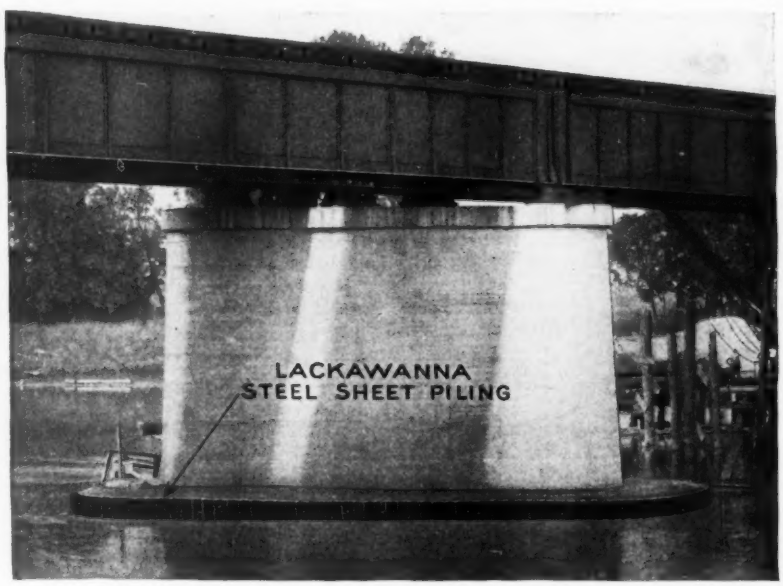
F. H. Bohlen,
660 Bullitt Bldg., Philadelphia, Pa.

Lackawanna Steel Sheet Piling used in Reconstructing Bridges, C. C. C. & St. L. Ry.

Typical of the bridges reconstructed since the Ohio floods in 1913 is the one south of Dayton on the Miami River, as shown in the pictures.

Nine piers and two abutments here were constructed within cofferdams of Lackawanna $12\frac{3}{4}$ by $\frac{3}{8}$ in. Straight-Web Sections in 20 to 30-foot lengths.

This sheet piling was driven on the neat lines of the pier footings and acted as forms for the concrete, which was placed under water after excavation of cofferdam by a clam shell bucket. All sheet piling was left in place as indicated by the detail photo.



Mr. F. W. Smith of the Walsh Construction Co., Davenport, Ia., builder of this and other bridges in the flooded district, tells us that the performance of the Lackawanna Sheet Piling was very satisfactory.

Steel Sheet Piling used in this way fills a double purpose; *first*, it offers a means of construction as a cofferdam, and *second*, a valuable permanent protection against scouring. In the instance cited, even if the stream scoured to the full depth of the pier footings, the strength of the interlocked piling joints is enough, including a big safety factor, to hold the retained material in place. About the only river piers that withstood the floods in this district were so protected, and even if the superstructure be carried away, piers encased in sheet piling are most likely to remain intact.

Our Sheet Piling Engineers have the experience and data to hand out some decidedly valuable advice on matters of this kind, and their co-operation is yours for the asking. Our new book "Lackawanna Steel Sheet Piling" will be sent free to any consulting, contracting or managing engineer.

LACKAWANNA STEEL COMPANY

General Sales Office and Works: Lackawanna, N. Y.

NEW YORK
BOSTON
BUFFALO
PHILADELPHIA
CLEVELAND
CINCINNATI
CHICAGO
DETROIT
ST. LOUIS
ATLANTA
SAN FRANCISCO

Licensees for the manufacture of Lackawanna Steel Sheet Piling:

For Great Britain and British Colonies in the Eastern Hemisphere, Cargo-Fleet-Iron Co., Ltd., Middlesborough, England. For France, Italy, Spain, French Colonies and Protectorates, Italian Colonies and Spanish Colonies in the Eastern Hemisphere: Cie Des Forges & Aciéries de la Marine et d'Homécourt, Paris, France.

Engineering News

CHARLES WHITING BAKER, *Editor*

Published Weekly by HILL PUBLISHING COMPANY

Tenth Avenue at Thirty-Sixth Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T McKEAN, Sec'y.

Cable Address: "ENGNEWS"

Subscriptions payable in advance, $5.00 a year for 52 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii, or the Philippines; $7.00 in Canada.

To foreign countries, including postage, $9.00 or its equivalent, 38 shillings; 38 marks; or 47 francs. Subscriptions for Great Britain, Europe or British Colonies may be sent to London Office, 6 Bouverie St., London, E. C., England. Notice to change address should be written to the New York Office in every instance.

Advertising copy should reach New York Office two weeks before date of issue. Entered at New York Postoffice as mail matter of the second class.

VOLUME 74 DECEMBER 30, 1915 NUMBER 27

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*ILLUSTRATED

Page

*CONCRETE-LINED RESERVOIR, SALT LAKE CITY, UTAH 1250
By Sylvester Q. Cannon
A 5,000,000-gal. reservoir lined with reinforced concrete without expansion joints. 400 w. 1 ill.
ENGINEERING NEWS, Dec. 30, 1915

*LOW CONCRETE DAM AT HARRISBURG ACROSS SUSQUEHANNA RIVER 1250
By Joel D. Justin
Low dam of economical design. Precast concrete beams laid on buttresses for upper decking. 2,700 w. 7 ill.
ENGINEERING NEWS, Dec. 30 1915

POINTERS FOR COMPARING TYPES OF PUMPING UNITS 1253
By George M. Peek
Reciprocating units familiar to employees. Architectural effect equalizes cost of buildings. Comparison of two St. Louis pumps. 1,200 w.
ENGINEERING NEWS, Dec. 30, 1915

*PROGRESS ON CALAVERAS EARTH DAM FOR SAN FRANCISCO 1254
The highest earth dam in the world, now under construction by the hydraulic process. 600 w. 2 ill.
ENGINEERING NEWS, Dec. 30, 1915

PRESENT CONDITION OF SECOND AVE. TEST PAVEMENTS 1255
By Henry Welles Durham
Brief summary of one of the most extensive experiments with city street paving. 1,900 w.
ENGINEERING NEWS, Dec. 30, 1915

STREET-CLEANING COST A FACTOR IN PAVEMENT DESIGN 1257
Extracts from paper presented by Gus H. Hanna at Worcester Road Congress. 700 w.
ENGINEERING NEWS, Dec. 30, 1915

*LAYING SUBMERGED WATER MAINS AT VANCOUVER, B. C. 1258
Cast-iron flexible joint pipes of 18-in. diameter laid in 75 ft. depth of water and rapid tidal current. 1,500 w. 4 ill. ENGINEERING NEWS, Dec. 30, 1915

*STEEL FRAMING OF LARGE POWER STATION 1260
Essex generating station of Public Service Electric Co., Newark, N. J. 2,700 w. 5 ill.
ENGINEERING NEWS, Dec. 30, 1915

Page

*COLEMAN DU PONT ROAD IN DELAWARE 1265
1,400 w. 4 ill. ENGINEERING NEWS, Dec. 30, 1915

*A 2,223-FT. CONCRETE-ARCH BRIDGE BUILT ON REVERSE CURVE 1268
By A. M. Richter
Third Ave. bridge across Mississippi River at Minneapolis; contains 211-ft. arch spans. 4,300 w. 7 ill.
ENGINEERING NEWS, Dec. 30, 1915

*SINKING A CYLINDER PIER BY OPEN DREDGING 1274
900 w. 1 ill. ENGINEERING NEWS, Dec. 30, 1915

*EQUIPMENT OF CONCRETING TRAIN 1275
600 w. 3 ill. ENGINEERING NEWS, Dec. 30, 1915

*TRAVELER FOR MOVING STEEL FORMS OF WATER CONDUIT 1276
300 w. 1 ill. ENGINEERING NEWS, Dec. 30, 1915

*BUILDING AN OIL-STORAGE PLANT UNDER DIFFICULTIES 1276
Two steel storage tanks on piles. Fire walls with pile foundations. 600 w. 2 ill.
ENGINEERING NEWS, Dec. 30, 1915

*A SIMPLE ACCOUNTING SYSTEM FOR HIGHWAY MAINTENANCE 1277
Developed by the Ohio State Highway Department. 900 w. 1 ill. ENGINEERING NEWS, Dec. 30, 1915

*TWO STEAM SHOVELS IN ONE CUT 1278
200 w. 2 ill. ENGINEERING NEWS, Dec. 30, 1915

TABLE OF FEET IN DECIMALS OF A MILE 1279
ENGINEERING NEWS, Dec. 30, 1915

NOTES FROM FIELD AND OFFICE 1280

GENERAL GOETHALS' REPORT ON THE PANAMA CANAL 1288
Reviews experience with slides, water-supply and lock operation. ENGINEERING NEWS, Dec. 30, 1915

EDITORIALS 1281
LETTERS 1284
NEWS OF THE ENGINEERING WORLD 1292
PERSONALS 1294
ENGINEERING SOCIETIES 1295

APPLIANCES AND MATERIALS 1296
CONSTRUCTION NEWS 1305
CONTRACTS TO BE LET 33
WANT ADVERTISEMENTS 36
ADVERTISING INDEX 80

NUMBER OF COPIES PRINTED THIS ISSUE, 21,000

None sent free regularly, no returns from news companies, no back numbers.

The Subscribers' Forum

Conducted by the Business Manager of the News

Opinions from Subscribers on the Reliability of Engineering News Advertisers

This week—Fred W. McKinnon, County Bridge Engr., Bellefontaine, Ohio

"RELIABLE and just as represented."

Because—

The advertisers who come to you with their messages, week after week, in Engineering News *know* they must make good.

Result—

The advertised goods are better and *you* are the one to benefit.

Only reliable manufacturers are unafraid of spotlight inspection.

That's why Mr. McKinnon finds Engineering News advertisers "reliable and just as represented."

WALTER V. SCOTT
COUNTY SURVEYOR

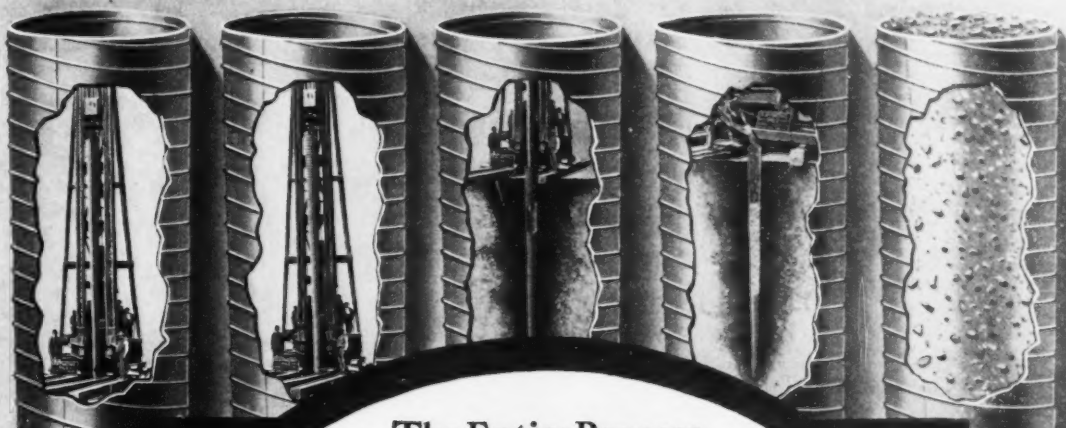
Bellefontaine, Ohio, 8 7-15.

Engineering News,
New York.

Gentlemen!

Many times during the past several years I have had occasion to refer to the advertising sections of the "News" and have always found them reliable and just as represented. I feel in specifying the products advertised in the "News" that the best is always obtained.

Fred W. McKinnon,
County Bridge Engineer.



The Entire Process
of placing

Raymond Concrete Piles
is always in sight

There is no working in the dark.
There is no guess work.
Every step is in plain view, thus assuring a perfect concrete pile from tip to top.
Every pile capable of sustaining from 30 to 50 tons.
A permanent form for each pile permits the placing of additional piles without disturbing the setting concrete, thus assuring

Speed with safety

Send for catalog

Raymond Concrete Pile Company

New York
140 Cedar Street

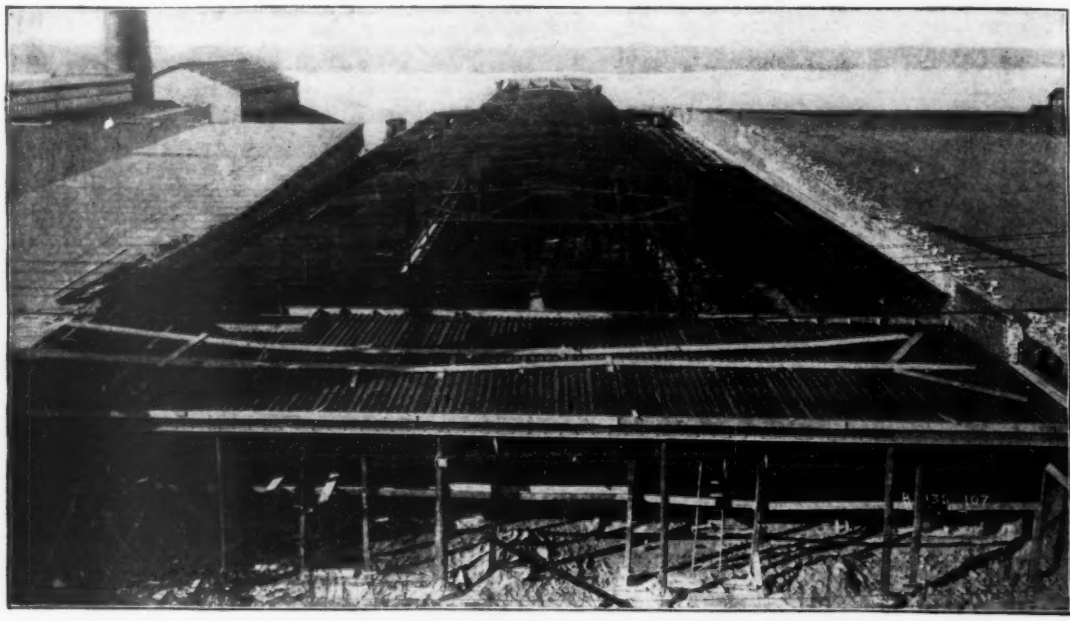
Branch Offices
in all Principal Cities

Chicago
111 W. Monroe Street

Raymond Concrete Pile Company
of Canada, Ltd., Montreal, Canada

A FORM FOR EVERY PILE
A PILE FOR EVERY PURPOSE

Raymond
CONCRETE PILES



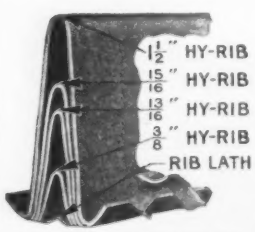
Hy-Rib roof ready for concreting, Hayden Pump Company, Quincy, Ill. No forms required

HY-RIB IN ALL TYPES FOR ALL USES RIB LATH

Hy-Rib is the universal material used everywhere in all types of construction. The many depths types and gauges of Hy-Rib and Rib Lath insure requisite strength and greatest economy. In concrete floors and roofs, Hy-Rib eliminates forms. In concrete walls, partitions, ceilings and furring Hy-Rib eliminates stiffening channels. In arched or curved work such as in floors, tanks, culverts, etc., Hy-Rib is furnished bent to the exact curve.

Our complete line includes, in addition to Hy-Rib and Rib Lath, Diamond Lath in two types Pressed Steel Channels and Studs of all varieties; four types of Corner Beads; three types of Base Screens, etc. **Prompt shipments are assured from our large stocks.**

Hy-Rib hand book furnished on request.

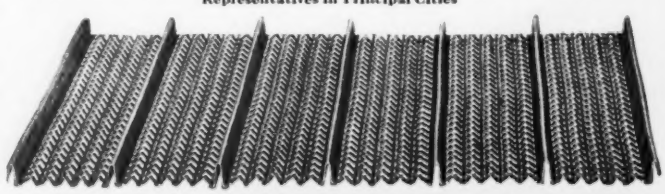


IT'S THE STRENGTH OF THE RIBS THAT COUNTS

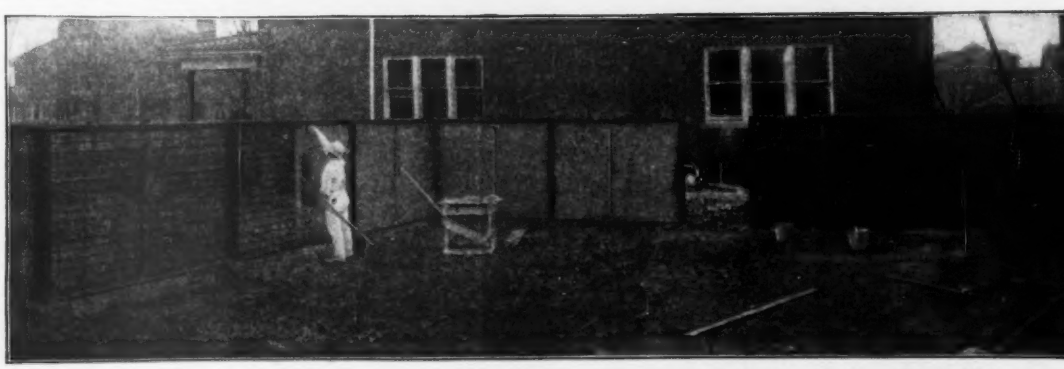
TRUSSED CONCRETE STEEL CO.

DEPARTMENT H-12 YOUNGSTOWN, OHIO

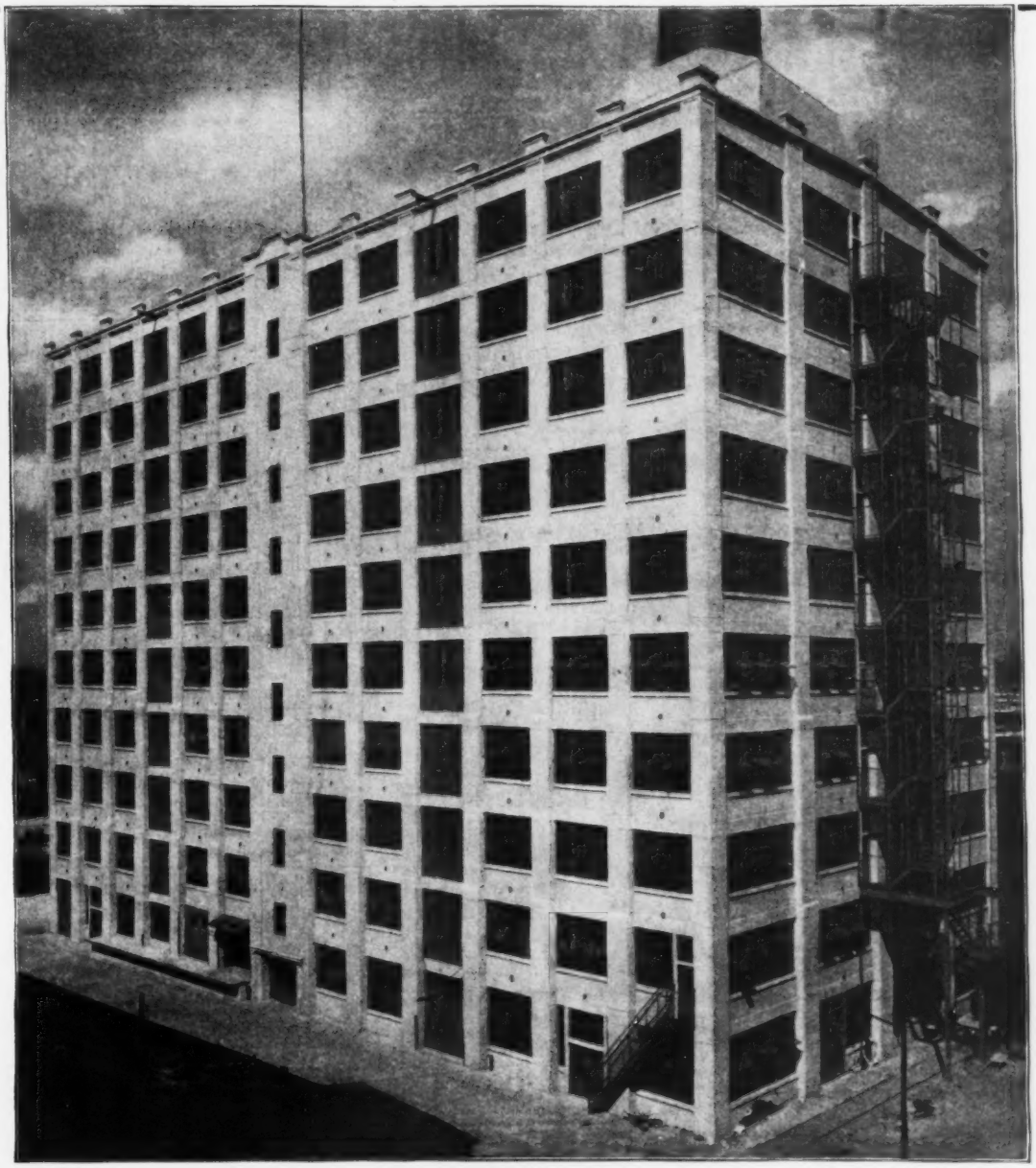
Representatives in Principal Cities



KAHN Buildin Product TRUSSED CONCRETE STEEL CO



Hy-Rib fence with Pressed Steel Posts and Cap during construction. No forms required. **Strasburg Residence, Detroit, Mich.** M. R. Burrowes, Architect.



Large installation of United Steel Sash in fireproof building of Hoboken Land & Improvement Company, Hoboken, N. J. Charles Fall, Architect. Turner Construction Company, Contractors.

UNITED STEEL SASH
The Standard Sash for Quality Buildings

Superior in strength, workmanship, weathering and glazing. Proven first in tests and comparisons. Furnished promptly in all types of pivoted and sliding sash, continuous sash, special casements, partitions, doors, etc.

Book on UNITED STEEL SASH furnished to interested parties.

KAHN Building Products

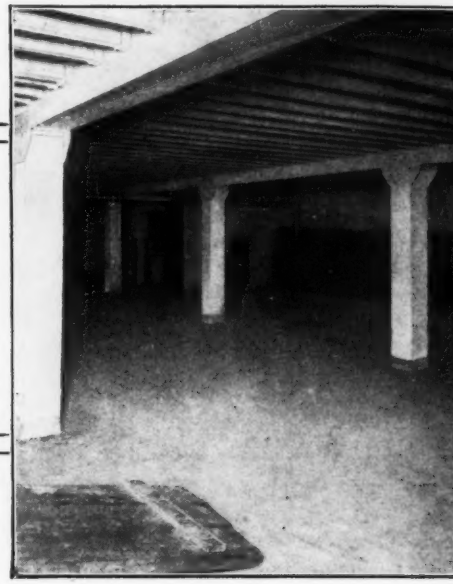
TRUSSED CONCRETE STEEL CO.

Dept. S-12 **YOUNGSTOWN, OHIO**

Representatives in Principal Cities

KAHN Building Products

WATER-PROOFS OIL-PROOFS **SMOOTH-ON** DUST-PROOFS WEAR-PROOFS



Before and After Being Water-Proofed With Smooth-On No. 7

The Musical Instrument Company plant located near the Morris Canal, Jersey City, was built on ground full of springs and very wet.

Illustration to the left shows the condition of the cellar when the problem of waterproofing it was presented to our engineering department.

Our engineers were told that this basement had to be absolutely dry as it is to be used for storing musical wires.

Illustration to the right shows the same cellar after being waterproofed with Smooth-On Iron Cement No. 7. The dark space shows where Smooth-On was extended up the side wall.

This work was done nearly four years ago and the cellar has remained perfectly dry and perfect for the storage of musical wire.

You can get real engineering instruction from Smooth-On Instruction Book No. 7. Fill out and mail the coupon for your copy.

SMOOTH-ON MFG. CO., Jersey City, N.

FREE

Smooth-On Mfg. Co., Jersey City, N. J.

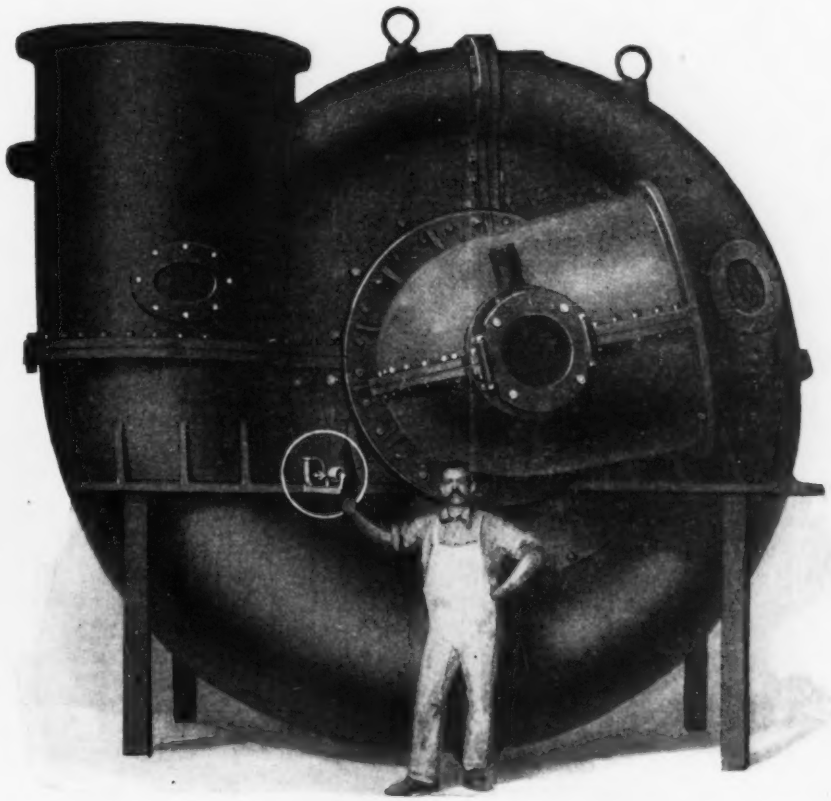
Gentlemen:

Please send me a free copy of your Smooth-On Instruction Book No. 7.

Name.....

Address.....

.....



Large or Small—The Same High Quality

This largest dredging pump in the world—with its 48″ discharge—and this small centrifugal pump—with its ¾″ discharge—give an idea of the wide range of pump building at the MORRIS WORKS.

MORRIS CENTRIFUGAL PUMPS

show a vast contrast here as to size but they are equal in one thing and that is High Quality.

Whether large or small, you can get the type of pump that best serves your conditions at the Morris Works and you have the satisfaction of knowing that you are buying a dependable pump under all conditions.

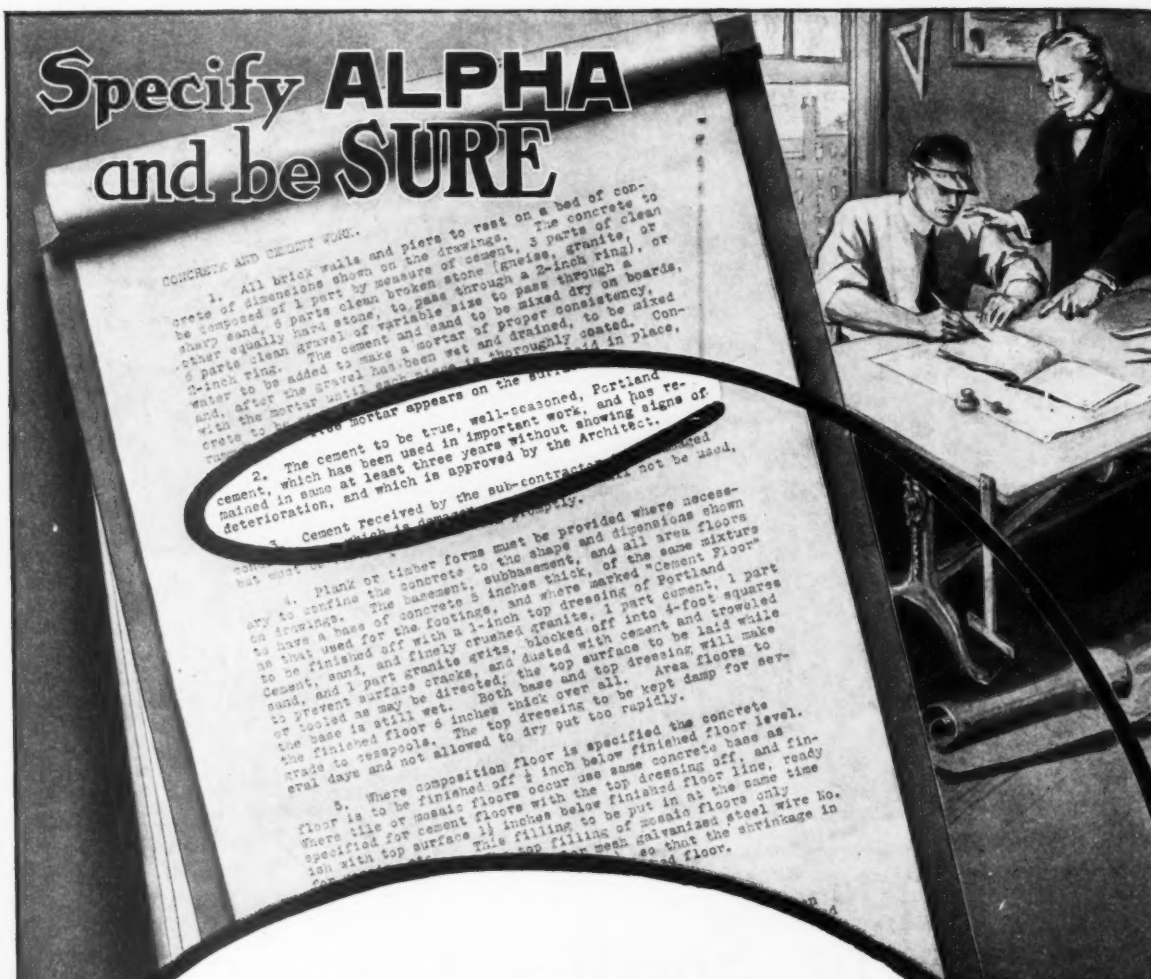
Send us your requirements and let us submit a proposition to you. No obligation. Have you a copy of the 126-page MORRIS BOOK, a complete treatise on Pumping and Dredging. A copy will be mailed to you free for the asking.

Morris Machine Works, Baldwinsville, N. Y.

Builders of Dredges, Centrifugal Pumps and Pumping Engines

Branch Offices in Principal Cities

Specify ALPHA and be SURE


CONCRETE AND CEMENT WORK.
1. All brick walls and piers to rest on a bed of concrete of dimensions shown on the drawings. The concrete to be composed of 1 part by measure of cement, 3 parts of clean sharp sand, 5 parts clean broken stone (gneiss, granite, or other equally hard stone, to pass through a 2-inch ring), or 5 parts clean gravel of variable size to pass through a 2-inch ring. The cement and sand to be mixed dry on boards, water to be added to make a mortar of proper consistency, and, after the gravel has been wet and drained, to be mixed with the mortar until
2. The cement to be true, well-seasoned, Portland cement, which has been used in important work, and has remained in sane at least three years without showing signs of deterioration, and which is approved by the Architect.
4. Plank or timber forms must be provided where necessary to confine the concrete to the shape and dimensions shown on drawings. The basement, subbasement, and all area floors to have a base of concrete 5 inches thick, of the same mixture as that used for the footings, and where marked "Cement Floor" to be finished off with a 1-inch top dressing of Portland Cement, sand, and finely crushed granite, 1 part cement, 1 part sand, and 1 part granite grits, blocked off into 4-foot squares or tooled as may be directed; the top surface to be laid while the base is still wet. Both base and top dressing will make the finished floor 6 inches thick over all. Area floors to grade to cesspools. The top dressing to be kept damp for several days and not allowed to dry out too rapidly.
5. Where composition floor is specified the concrete floor is to be finished off ½ inch below finished floor level. Where tile or mosaic floors occur use same concrete base as specified for cement floors with the top dressing off, and finish with top surface 1½ inches below finished floor line, ready for top filling to be put in at the same time

Probably no article of a staple nature is made up to a better general standard of quality than Portland Cement. But U. S. Government tests recorded in Taylor & Thompson's "Concrete—Plain and Reinforced" show that the best grades of Portland Cements may be considerably more economical in use than average grades. The Government, in its Farm Bulletins, advises that a guaranteed Portland Cement always be used.

Cement is the sinew of the concrete construction. Sinews cannot be too good. Examine a handful of ALPHA CEMENT under a microscope and you will find no coarse or underburned particles to lower binding power. Whether you make your own tests or not, you can always krow that the ALPHA CEMENT you use has been subjected to the hourly test at the mill and is sure to more than meet all standard requirements. You don't have to buy ALPHA on mere assurances of quality. The word "Guaranteed" is stamped on every bag.

Alpha Portland Cement Co.

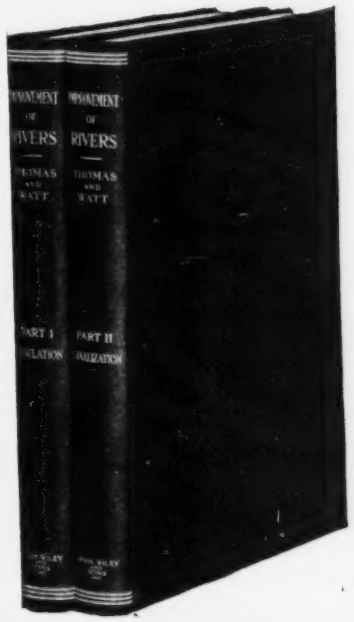
General Offices: EASTON, PA.

SALES OFFICES:

New York, Chicago, Boston, Pittsburgh, Philadelphia, Buffalo, Baltimore and Savannah

Are You Interested in River Regulation or Improvement?

If so, you should not be without this work



The Improvement of Rivers

Revised and Rewritten. 2nd Edition. By **B. F. Thomas,** U. S. Principal Assistant Engineer, and **D. A. Watt,** U. S. Assistant Engineer.

It is the most comprehensive book now offered on the subject.

Part I. discusses the *Improvement by Regulation,* with a detailed treatment of dredging, protection of banks, storage reservoirs, etc.

Part II. discusses *Improvement by Canalization.* All interested in locks and dams of all types will find here a thorough treatment. Attention is especially called to the comprehensive treatment of movable dams, covering over 100 pages.

PRESS COMMENTS

"* * * will be found to be a creditable addition to any river engineer's library." *Engineering News.*

"The book is unusually complete. It deals not only with what has been done in the United States but is an encyclopedia embracing good practice in river regulation in all parts of the world." *Engineering Record.*

"* * * may confidently be recommended to all engineers and their staffs engaged upon river or canal works, whether in designing or in the practical management of completed works." *The Engineer—London.*

772 *pages,* 9x11½, *profusely illustrated,* 2 *volumes. Cloth,* **$7.50** *net.*

John WILEY & Sons, Inc.

432 Fourth Avenue
NEW YORK CITY

London, Eng.
Chapman & Hall, Ltd.
Montreal, Can.
Renouf Pub. Co.

A Standard Book for Engineers

TREATISE ON HYDRAULICS **9th Edition**
By **Mansfield Merriman,** Mem. Am. Soc. C. E. Present Edition revised and rewritten with the assistance of Thaddeus Merriman.
Contains the results of the most recent experiments on the flow of water.
565 *pages,* 6 *x* 9, *illustrated. Cloth,* $4.00 *net.*

RIVER DISCHARGE **3rd Edition**
By **John C. Hoyt,** Mem. Am. Soc. C. E., and **Nathan C. Grover,** Mem. Am. Soc. C. E.
Describes the instruments and equipment and other installation, the methods of measuring stream flow, the interpretation and use of run-off data, and many other salient points in connection with this subject
183 *pages,* 6 *x* 9, *illustrated. Cloth,* $2.00 *net.*

HYDRAULIC TABLES **2nd Edition**
By Professor **Gardner S. Williams,** Univ. of Michigan, and **Allen Hazen,** Mem. Am. Soc. C. E.
Treats on the flow of water over sharp-edged and irregular weirs and the quantity discharged, as determined by Bazin's Formula and experimental investigations upon large models.
104 *pages,* 6 *x* 9. *Cloth,* $1.50 *net.*

CLEAN WATER AND HOW TO GET IT **2nd Edition**
By **Allen Hazen,** Mem. Am. Soc. C. E.
Deals with the means now used by American cities to secure clean water.
196 *pages,* 5¼ *x* 8, *illustrated. Cloth,* $1.50 *net.*

PUBLIC WATER SUPPLIES **2nd Edition**
By Professors **F. E. Turneaure** and **H. L. Russell,** University of Wisconsin.
Covers the requirements, resources and the construction of works.
808 *pages,* 6 *x* 9, *illustrated. Cloth,* $5.00 *net.*

FREE EXAMINATION OFFER

This coupon properly filled in will bring copies of any of these books to you for examination, *no cash in advance.* Merely indicate the national engineering society of which you are a member, or supply a reference. At the end of ten days you are to remit their price or return them postpaid.

If cash accompanies the order, and you should find the books unsatisfactory, we will refund your money provided the books are returned within ten days after their receipt. These privileges are extended only to those residing in the United States. All orders must be forwarded directly to us.

USE THIS COUPON

John Wiley & Sons, Inc., 432 Fourth Ave., N. Y. City.

Gentlemen—Kindly send me the books indicated below for

10 Days' Free Examination.
10 Days' Approval. (Remittance enclosed.)

.....
.....
.....
.....
.....

I agree to the terms stated in your advertisement, as to the conditions of examination.

Name.....
Address.....
.....
I am a member of.....
(State what Society.)
Reference.....
(Not required of society members.)

E.N. 12-30-15

Selling Like Sixty—
Why Don't You Buy One!

Among mechanical products the sales-curve of a product is a direct index of its quality.

The light weight, portability, and low price of RANSOME'S BANTAM would not cause repeat orders unless this machine could turn out the stuff. It can!

Do away with bag splitting—get an outfit that will go where big mixers won't—that will start and finish your big jobs or handle any job alone. Write at once for a Ransome man to call on you.

Specifications

Capacity, 1 bag batch up to 1-3-6.
Horsepower, 3.
Height of feed platform 27″.
Weight without Runways or Platform, 2,275 lbs.
Weight with Platform and Runways, 2,700 lbs. Height of discharge, 26″.
Thickness of Drum Shell, No. 10 gauge.
Thickness of Mixing Blades, No. 10 gauge.
Self Oiling Rollers.
Wheels, 20″ x 3″.
Price means complete machine with platform and runways.

Ransome Concrete Machinery Co
Dunellen - - - New Jerse

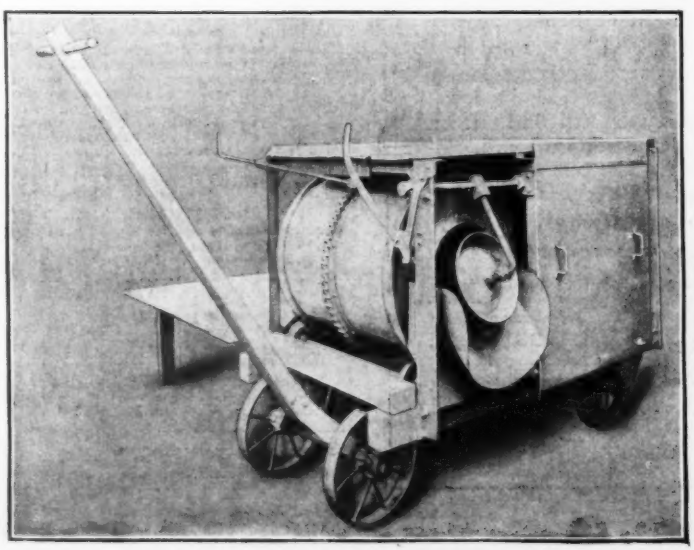
Chicago Office: Fisher Building

W. E. AUSTIN MACHINERY CO., Southern Sales Mgrs., Atlanta, Ga., New Orleans, Houst Dallas, Memphis, Richmond. **F. H. Hopkins & Co., General Agents for Canada,** Montr Winnipeg, Vancouver.

Boston: 6 Beacon Street; Buffalo: 4 Builders Exchange; Cincinnati: Merchants Building; Clevela 505 Bangor Building; Columbus: Ransome Concrete Machinery Co.; Denver: Mine & Smelter Sup Co.; Detroit: W. H. Anderson Tool & Supply Co.; El Paso: Mine & Smelter Supply Co.; Kansas C Kan.: Contracting Machinery Co.; Los Angeles: N. B. Livermore & Co.; Mexico City, Mex.: M & Smelter Supply Co.; Minneapolis, Charles Houston, Plymouth Building; New York: 103 P Avenue; Philadelphia: Commonwealth Building; Pittsburgh: Baird Machinery Co., 123 Water Portland, Ore.: Northwestern Equipment Co.; Salt Lake City: Mine & Smelter Supply Co.; San Fr cisco: N. B. Livermore & Co.; Seattle: Northwestern Equipment Co.; St. Louis: The Granville Sup Co.; Syndicate Trust Building.

FOREIGN AGENTS: Buenos Aires: Venge y Cia, Casilla, Correo 1273; Copenhagen: Isidor Heim & Co.; Milan: E. Parodi Delfino.

$275



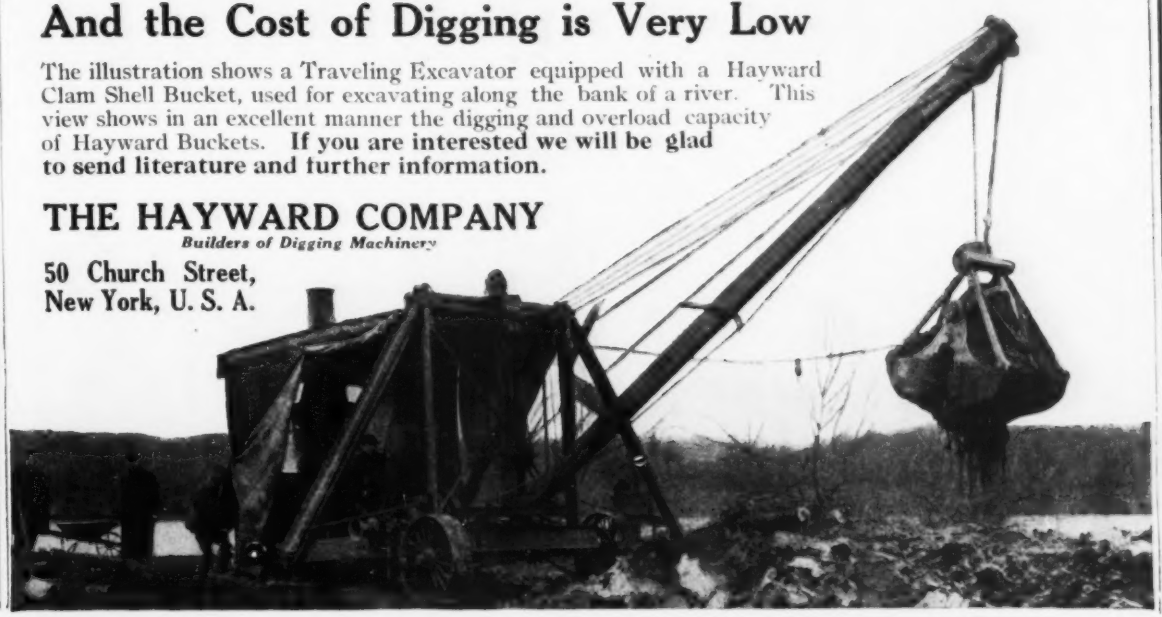
F.O.B. Dunel

You Can Dig Almost Any Material With HAYWARD CLAM SHELL BUCKETS

And the Cost of Digging is Very Low

The illustration shows a Traveling Excavator equipped with a Hayward Clam Shell Bucket, used for excavating along the bank of a river. This view shows in an excellent manner the digging and overload capacity of Hayward Buckets. **If you are interested we will be glad to send literature and further information.**

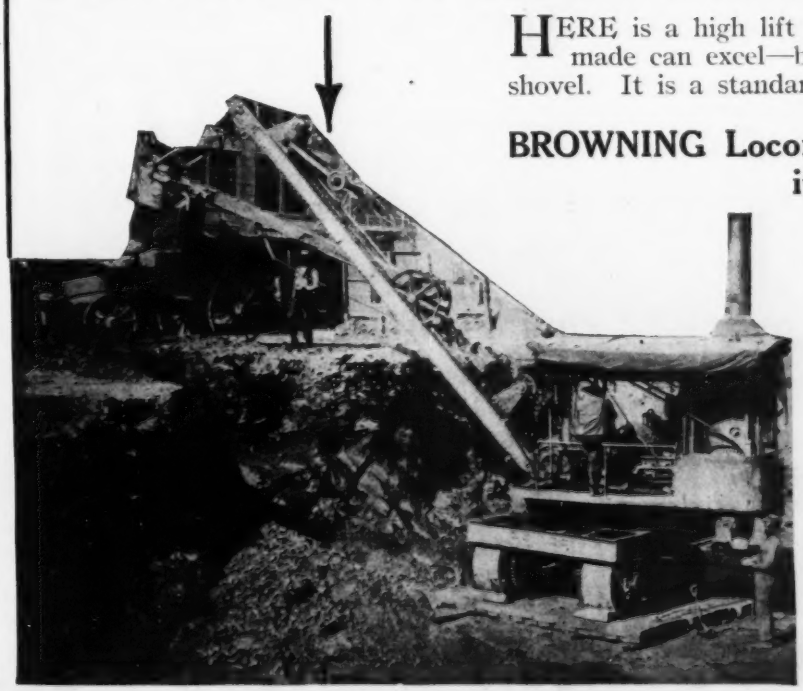
THE HAYWARD COMPANY
Builders of Digging Machinery
50 Church Street,
New York, U. S. A.



That Lift is a BROWNING Feature

HERE is a high lift that no steam shovel made can excel—but this is not a steam shovel. It is a standard

BROWNING Locomotive Crane with its shoveling boom attached



Your Browning is a LIVE piece of machinery. It isn't confined to crane work, nor to shoveling, nor to pile-driving, nor to dredging—*it does all*. Regarding quality—we do not believe it is possible to build a better piece of heavy machinery.

Are you digging for foundations? This Browning handles a good 800 cubic yards each 9-hour day.

INVESTIGATE the Browning. Write us.

The BROWNING Co.
Cleveland, Ohio
Sales Offices:
New York, Philadelphia, Chicago
San Francisco

SOUTHWARK

Piercing and Drawing Presses

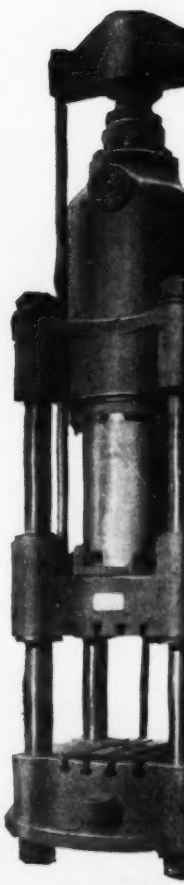
The Southwark 350-ton Shell Piercing Press is suitable for all of the piercing operations connected with the manufacture of steel shells.

This type press is the result of extensive experience in building hydraulic equipment.

The speed and pressure are absolutely correct and although built with the idea of obtaining the greatest strength, the press is easily operated and readily controlled.

There are other Southwark designs for nosing and band-shrinking operations.

If in need of hydraulic equipment for any purpose consult us.



350-Ton Shell Piercin

The services of our corps of expert engineers are at the disposal of manufacturers desiring press equipment for the production of steel shells. Write for a copy of our Bulletin.

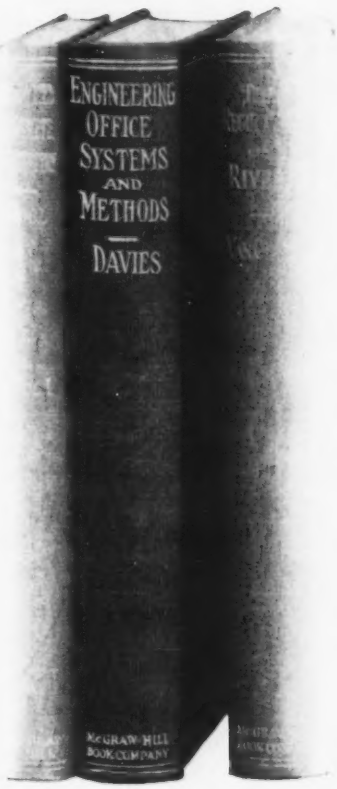
SOUTHWARK FOUNDRY & MACHINE C

Old Colony Bldg., Chicago

Home Office and Works: **Philadelphia**

Brown-Marx Bldg., Bir

Engineering Office Systems and Methods



By **John P. Davies,** M.E., Assoc. Member Am. Soc. C. E. 544 *pages,* 6x9, 243 *illustrations,* $5.00 (21*s*) *net, postpaid.*

A practical book devoted to the systems and methods of the modern engineering office. It is filled with "reminders" on every detail likely to arise in daily office routine.

It is not merely a book of forms and directions but a practical, comprehensive treatment of the varied problems which the office engineer has to meet.

I. Collection of Preliminary Data for Engineering Projects.
II. Designing and Drafting Systems.
III. Specifications for Engineering Material.
IV. Reminders for Obtaining Quotations on Standard Material.
V. Purchasing - Office Methods and Forms.
VI. Cost Keeping and Estimating.
VII. Sampling, Inspecting and Testing Engineering Material.
VIII. Domestic Shipping.
IX. Export Shipping.
X. Progress Charts, Scheduling Systems, etc.
XI. Indexing and Filing Systems, etc., for the Engineering Office.
XII. Drawing-Office Systems and Methods.
XIII. Miscellaneous.

Smith—Construction of Masonry Dams

By **Chester W. Smith,** Consulting Engineer. 279 *pages,* 6x9, *fully illustrated,* $3.00 (12/6) *net, postpaid.*

A practical book written from the point of view of the construction engineer.

It covers thoroughly modern construction methods from exploring the site to final details of face work. It contains a very complete and concise collection of data on estimates of cost.

Lauchli—Tunneling

By **Eugene Lauchli,** Civil Engineer. 238 *pages,* 6x9, 197 *illus.,* $3.00 (12/6) *net, postpaid.*

A practical treatise on tunneling for the engineer and the contractor. The only book that covers all classes of tunnel work.

The underlying principles necessary to the solution of tunnel problems are fully set forth and illustrated by practical examples.

Fish—Engineering Economics

By **John C. L. Fish,** Mem. Am. Soc. C. E., A. R. E. A. Professor of Railroad Engineering, Leland Stanford Junior University. 217 *pages,* 6x9, *with tables and charts,* $2.00 (8/4) *net, postpaid.*

A sound discussion of fundamental economic principles, prepared in the belief that to the engineer, a working knowledge of first principles is as essential in the Economics as in the Mechanics of Structures.

Rindsfoos—Purchasing

By **C. S. Rindsfoos,** C. E. President of the U. S. Purchasing Corporation; formerly Secretary-Treasurer The Foundation Co. 165 *pages,* 6x9, $2.00 (8/4) *net, postpaid.*

Successful buying is a fine art in which tact and experience play an important part. Through concentration and the study of merchandising from the buyer's viewpoint, Mr. Rindsfoos has compiled this book on the art of buying.

McGraw-Hill Book Co., Inc.
239 West 39th Street, New York
LONDON **BERLIN**
Publishers of Books for the Engineering News.

Free Examination

We will send these books or any book published by the McGRAW-HILL BOOK COMPANY, Inc., to any subscriber to the ENGINEERING NEWS or any member of the American Society of Civil Engineers for ten days' free examination.

If you are not a subscriber to ENGINEERING NEWS or a member of the American Society of Civil Engineers, a reference will give you the same privilege.

No books sent on approval outside of the United States or to booksellers or agents.

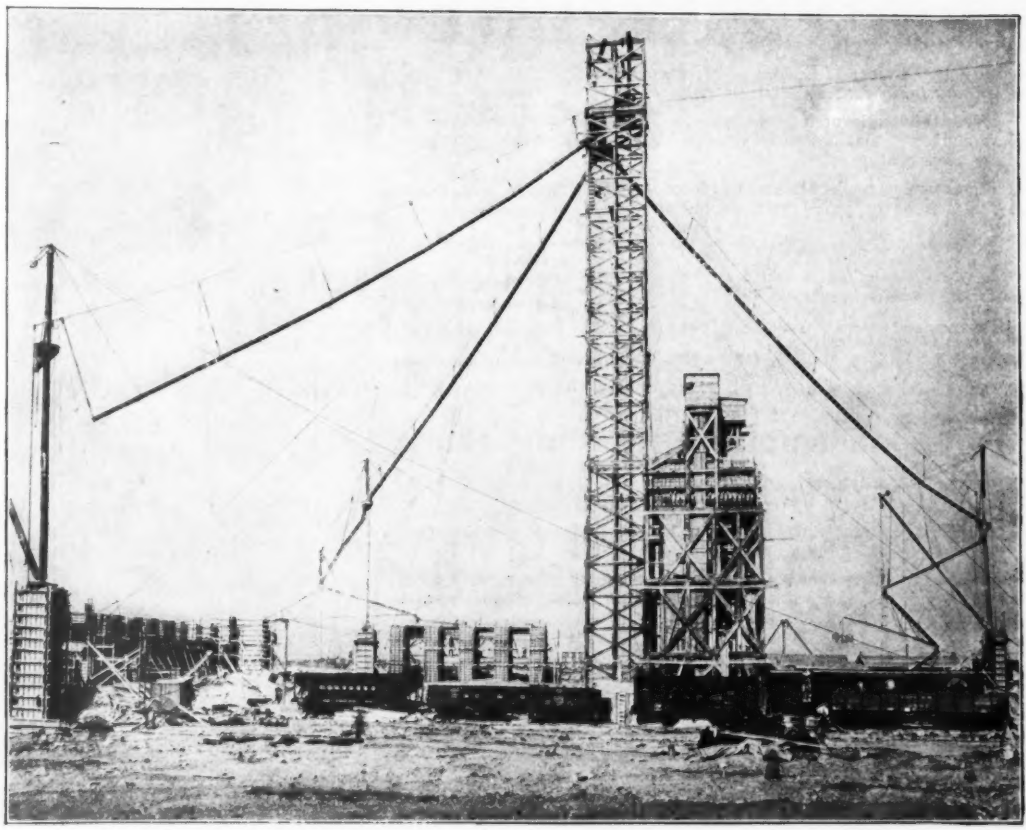
The new 1915-16 McGraw-Hill catalogue will be sent free on request.

FREE EXAMINATION COUPON

McGraw-Hill Book Company, Inc., 239 West 39th St., New York
You may send me the following on 10 days' approval:
....**Davies—Engineering Office Systems and Methods. $5.00 net.**
.....
.....
I agree to pay for the books or return them postpaid within 10 days of receipt.
....I am a regular subscriber to ENGINEERING NEWS.
....I am a member of the Am. Soc. C. E.
Signed.....
Address.....
Reference.....N12-30
(Not required of subscribers to ENGINEERING NEWS or members of Am. Soc. C. E.)

"The Flexibility of a Hose"

The Insley Gravity Plant on the Field Museum, Chicago



The Thompson-Starrett Co., Contractors Plant sold by R. H. Hyland & Co., Chicago.

THE Plant consists of a central tower with four-way hopper, four lines of fixed chutes 150 feet long radiating to four derricks occupying the quarter sections. Each derrick covers 140 feet radius by means of a system of counterweighted chutes. An additional section of chute reaches the far corners. The whole area is covered by these four derricks "with the flexibility of a hose."

The **INSLEY GRAVITY PLANT** for Concrete Distribution is pre-eminently the **EFFICIENCY PLANT.** Let us work with **you** and **your** concrete distribution problem. Our Engineering Department is at your service.

INSLEY MFG. CO., ***Engineers and Manufacturers*** **Indianapolis**

TELEPHONE HARRISON 1147

ADDRESS ALL CORRESPONDENCE TO THE COMPANY

PULSOMETER STEAM PUMP CO.
SOLE OWNER AND MANUFACTURER OF THE "PULSOMETER"

MAYS & TALLEY CO
WESTERN REPRESENTATIVES

900 LYTTON BLDG. Chicago Dec. 17, 1915.

Pulsometer Steam Pump Co.,
17 Battery Place,
New York City, N.Y.

Dear Sirs: Attention Mr. W.J. Barrow Secy.

We are pleased to report sales so far in this month, as follows:

(1) Number 6 improved pattern
(2) " 7 " "
(1) " 6 " "
(2) " 5 " "
(1) " 3 " "

We take it from these sales in this territory, (when you consider we have winter on our hands) that the contractors in and around Chicago are fast realizing the economy and simplicity of our pump; it makes a big hit with them when we actually show that the pump does not require any oil or lubrication.

We wish you would ship us at once via fast freight, pumps same as we have sold as per above, as we do not want to get caught short; trusting these will come forward at once, we remain.

Very truly yours

Mays & Talley Co.

DECEMBER 1915

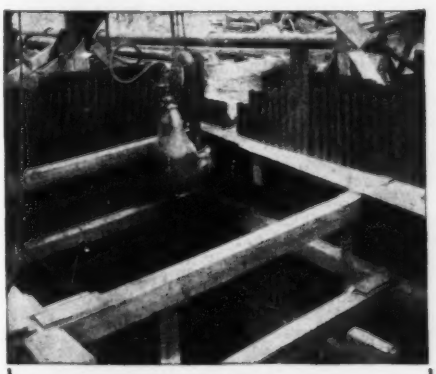
Seven Pulsometers Sold in Chicago in 17 Days

Yes, Indeed! Chicago Contractors are getting wise

This letter has just been received from our Chicago office. Read it! It explains *why* the sales of

PULSOMETER

are good even in Winter—and it shows that our constant hammering on the NO LUBRICATION feature of this pump is *right!* This *is* the point that "gets" a contractor. It "gets" him where he's tender, in the pocketbook.



Think of a pump that will handle practically anything that will flow; water thick with mud, sand, grit, pebbles and containing large quantities of air—lift it 15 or 20 feet by suction, NEVER requires any oil or grease—no special boiler—no foundation—no skilled labor. A pump that's good anywhere on any kind of excavation or pumping-out job. Why not get wise yourself? Write at once for new catalog.

Why *You* Should Buy Pulsometers

1. Will pump practically anything.
2. Are economical of steam.
3. No foundation or special boiler.
4. No skilled labor.
5. NO LUBRICATION.
6. Will pump under water or lift 15 or 20 feet by suction.
7. EXCEED THEIR RATINGS.

Pulsometer Steam Pump Company

18 Battery Place, New York

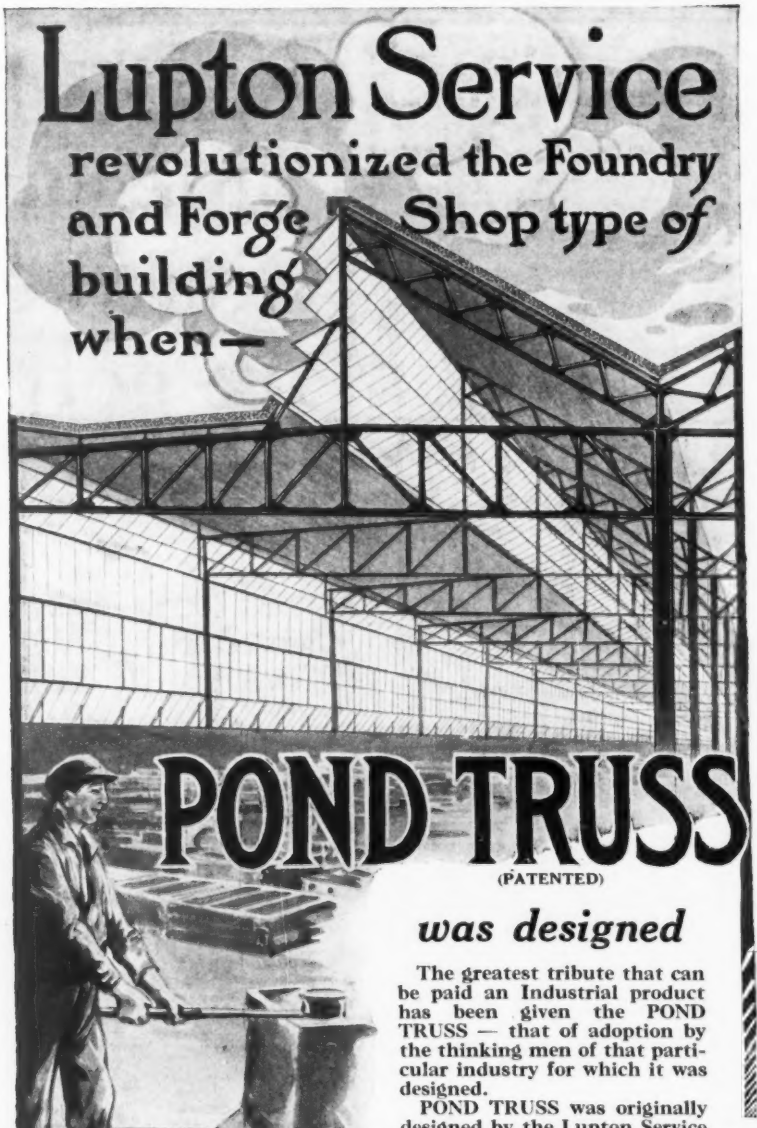
930 Lytton Bldg., Chicago

Pulsometers Carried in stock by the following Agents:

Harold L. Bond Co., 391 Atlantic Ave., Boston, Mass.
Haubtman & Loeb Co., 717 Magazine St., New Orleans, La.
Harron, Rickard & McCone, 139 Townsend St., San Francisco, Cal.
Harron, Rickard & McCone, 144 N. Los Angeles St., Los Angeles, Cal.
Miller Supply Co., Huntington, West Virginia.
Queen City Supply Co., S. W. Cor Elm and Pearl Sts., Cincinnati, Ohio.
Somers, Fitler & Todd Co., 323 Water St., Pittsburgh, Pa.
The Wheland Company, Chattanooga, Tenn.
V. H. Kreigshaber & Son, Atlanta, Ga.
Pocatello Eng. & Mach. Co., 129 So. Main St., Pocatello, Idaho.
H. A. Paine, Houston, Texas.
A. R. Williams Machinery Co., Toronto, Ont., Canada.
F. H. Hopkins & Co., Montreal, Quebec, Canada.
Henry H. Meyer Co., 110 So. Howard St., Baltimore, Md.
Standard Supply & Equipment Co., 1810 Market St., Philadelphia, Pa.
W. H. Zeigler, 320 Temple Court, Minneapolis, Minn.
Thos. L. Barrett, 27 No. 3rd St., Louisville, Ky.

Lupton Service

revolutionized the Foundry and Forge Shop type of building when—



POND TRUSS

(PATENTED)

was designed

The greatest tribute that can be paid an Industrial product has been given the POND TRUSS — that of adoption by the thinking men of that particular industry for which it was designed.

POND TRUSS was originally designed by the Lupton Service to solve the Daylighting and Ventilating problem f the General Electric Company's Erie Works.

So well did this finished product succeed is evinc in the widespread interest and many important i stallations in Foundries, Forge Shops, Glass Fa tories, Machine Shops, Power Houses and Steel Mi in this country and in other lands.

POND TRUSS not only provides for an even a perfect distribution of light, but is designed to eli inate the unnecessary cross-section of buildi making the roof areas of such size, slope, and in such location as it may be necessary to deflect gases tows sash, preventing down draughts and all reverse currents when sashes are open. Owners are so well satisfi that in a number of instances old buildings have been remodeled and Pond Truss applied to reduce the tonna cost by making it practical to operate the buildings under all weather conditions and secure maximum produ tion from each workman, and that any additional cost of Lupton Products over the less meritorious in desi and quality of workmanship is compensated for by service, cost of up-keep and all-round satisfaction.

LUPTON STEEL SASH

are used in side walls and monitor of roof of proper type and construction to freely ventilate and light entire floor areas under all weather conditions.

Lupton service is maintained to give authoritative information about any lighting and ventilating problem, without charge and without obligation.

The Lupton Catalogue No. 8 illustrates many examples of the finest buildings as erected in various parts of the world and gives comprehensive and valuable data relative to the subject of Daylight and Ventilation—a copy awaits your request.

The following installations are but a few of the many notable Buildings that are built around POND TRUSS, including vari other Lupton Daylighting and Ventilating Products.

General Electric Company, Erie, Pa.
Toledo Glass Company, Toledo, Ohio.
Owens Bottle Machine Co., Toledo, Ohio.
Cleveland Electric Illuminating Co., Cleveland, O
National Supply Co., Toledo, Ohio.
West Steel Castings Co., Cleveland, Ohio.
Erie Malleable Co., Erie, Pa.
International Harvester Co., West Pullman, Ill.

David Lupton's Sons Company, Tulip and Westmoreland Streets, Philadelphia,

Contracts to Be Let

Bids received until Jan. 18, 1916.

Garbage Disposal

New York City, N. Y.

Bids or estimates for the disposal of garbage will be received until 12 o'clock noon, on Tuesday, January 18, 1916, at Room No. 1247, Municipal Building, Borough of Manhattan, The City of New York.

Form No. 1, for the disposal of garbage from the Boroughs of Manhattan, The Bronx and Brooklyn, for a period of five years, beginning January 2, 1917. The bidder to provide the site for the plant and to pay the City for the privilege of garbage disposal.

Form No. 2, for the disposal of garbage from the Boroughs of Manhattan, The Bronx and Brooklyn, on a site provided by the City of New York, for a period of five years, beginning January 2, 1917. The City will acquire the plant upon the termination of the contract at a stipulated price.

For further information concerning these contracts, see current issues of The City Record, published at 96 Reade St., N. Y. City, or apply to the Commissioner of Street Cleaning, Municipal Building, New York City.

Bids received until Jan. 5, 1916.

Furnishing Piling, Lumber, etc.

New Orleans, La., Dec. 3, 1915.

Sealed proposals will be received by the Board of Commissioners of the Port of New Orleans until January 5, 1916, at 8:00 p.m., for furnishing creosoted and untreated piling, creosoted lumber, creosoted sheet piling and creosoted wood block, or creosoted piling only, untreated piling only, creosoted lumber only, creosoted sheet piling only and creosoted wood block only, as may be required in the construction of the Dumaine Street Wharf.

Deposit—$3,000.00 cash or certified check.

Payment—monthly in full for material received, 50% allowed for material treated on requisition and not then ordered.

Bond—50% of the amount of the contract.

On and after Dec. 6, 1915, specifications will be on file at the office of the Engineer, J. Devereux O'Reilly, by whom full sets will will be furnished to prospective bidders on deposit of $10.00, which will be refunded to depositors who submit proposals and return sets in good condition.

To depositors not submitting proposals, $5.00 will be refunded on return of set in good condition. The right is reserved to reject any and all bids, and to waive any informality in the bids received.

ERNEST M. LOEB, President.

Bids received until Jan. 13, 1916.

Purchase and Wrecking of School

THE BOARD OF EDUCATION
Office of the Secretary
Paterson, N. J., Dec. 21st, 1915.

Sealed proposals are hereby solicited for the purchase of and the wrecking of the present school building No. 10, situated on the corner of Warren and Mercer Streets, Paterson, N. J.

The above work is to be done in accordance with the specifications of Fred W. Wentworth, Architect, copies of which may be had at the office of the Architect, Room 502 Citizens Trust Building, this city. Proposals must be enclosed in sealed envelopes addressed "Proposals for purchase and wrecking of old School No. 10," addressed to the undersigned and delivered at Room No. 24, City Hall, Paterson, N. J., on or before Thursday, Jan. 13th, 1916, at five o'clock in the afternoon.

The Board of Education reserves the right to reject any or all bids and to waive any defects or informality in any bid, should it be deemed to the best interest of the city so to do.

By order of the Board of Education.

LEONARD STOLK, President.
JAMES F. DUNPHEY, Secretary.

Bids received until Jan. 4, 1916.

Barge Canal Work

STATE OF NEW YORK,
OFFICE OF SUPERINTENDENT OF PUBLIC WORKS.
Albany, December 6th, 1915.

Sealed proposals will be received by the undersigned at his office in the Capitol, at Albany, N. Y., until twelve o'clock noon of Tuesday, January 4th, 1916, at which place and hour they will be publicly opened and read, for improving the New York State canals pursuant to the provisions of Chapter 147, Laws of 1903, and of the amendments thereto, as follows:

CONTRACT NO. 73-A (Revised).
Champlain Canal—Section 1.

For completing the construction of the canal from Northumberland to Stillwater.

Length about 15.0 miles. Sheets 1 to 16 inclusive.

Plans may be seen and detailed specifications, engineer's estimate of quantities, proposal blanks, form of contract and bonds required and other information for proposers may be had at the office of the Superintendent of Public Works at Albany, N. Y., at the office of the Assistant Superintendent of Public Works for the Middle Division at Syracuse, N. Y., at the office of the Assistant Superintendent of Public Works for the Western Division at Rochester, N. Y., and at the canal office, Spaulding's Exchange, Buffalo, N. Y.

Copies of detailed plans or drawings may be obtained from the State Engineer and Surveyor at Albany, N. Y., upon payment to him of the cost of producing them.

Monthly estimates will be paid of ninety per centum (90 per cent.) of the work done at the contract price. Every proposal for said work must be accompanied by a money deposit in the form of a draft or certified check upon some good banking institution in the City of Albany or New York, issued by a national or State bank in good credit within the State and payable at sight to the Superintendent of Public Works for five per centum (5 per cent.) of the amount of the proposal.

The person whose proposal shall be accepted will be required to execute a contract and furnish bonds within ten days from the date of notice of award delivered to him or them in person or mailed to the address given in the proposal.

Upon execution of the contract and approval of bonds, the certified check or draft will be returned to the proposer unless the same shall have been presented for collection prior to such time, in which case the amount of the deposit will be refunded by the Superintendent of Public Works.

The deposits of bidders other than the one to whom the award of contract shall be made will be returned immediately after the award has been made.

The amount of bond required for faithful performance will be ten per centum (10 per cent.) of the amount of the estimated cost of the work according to the contract price, and an additional bond, known as the labor bond, in the sum of ten per centum (10 per cent.) of the amount of the estimated cost of the work according to the contract price, will be required as security that the contractor will pay in full at least once in each month all laborers employed by him upon the work specified to be done in the contract.

In the event that more than one surety company is offered as surety on said bonds, coinsurance only will be accepted.

Each proposal must be addressed to the Superintendent of Public Works, Albany, N. Y., and must be endorsed on the envelope with the name of the construction for which the proposal is made.

Award, if made, will be made to the person or persons whose proposal shall be lowest in cost to the State for doing the work, and which shall comply with all provisions required to render it formal. Before any award shall be made the lowest bidder will be required to satisfy the Superintendent of Public Works of his ability to provide suitable equipment and materials for the proper performance of the work.

The right is reserved to reject all proposals and readvertise and award the contract in the regular manner if, in the judgment of the undersigned, the interests of the State will be enhanced thereby.

W. W. WOTHERSPOON,
Superintendent of Public Works.

Bids received until Jan. 17, 1915.

Brick Pavement

BOARD OF LOCAL IMPROVEMENTS

City of Evanston, Ill.

Notice is hereby given that bids will be received for paving with brick on concrete portions of Simpson Street, Bridge Street, Leon Place, Asbury Avenue, Grant Street, Noyes Street, Leonard Place, Washington Place, Wesley Avenue, Jackson Avenue, Ashland Avenue and Payne Street, amounting to approximately 29,900 square yards, as a whole, in accordance with the ordinance therefor. Said bids will be opened on the 17th day of January, 1916, at the hour of 8 p.m., in the Mayor's office in the City Hall of the City of Evanston.

The specifications for such improvement and blank proposals will be furnished at the office of the Commissioner of Public Works of the City of Evanston.

The Contractor will be paid in bonds, which bonds shall draw interest at the rate of five (5) per centum per annum, except payment (if any) to contractor by warrant against the first installment, shall bear no interest.

All proposals or bids must be accompanied by a certified check payable to the order of the President of the Board of Local Improvements of the City of Evanston for a sum not less than ten (10) per centum of the aggregate of the proposal. Said proposals or bids must be delivered to the President of the Board of Local Improvements in open session of said Board at the time and place fixed herein for opening the same. No proposal or bid will be considered unless accompanied by a check as herein provided.

The Board of Local Improvements reserve the right to reject any or all bids should they deem it best for the public good.

The successful bidder will be required to furnish a Performance bond equal to the contract and a Maintenance bond equal to twenty-five (25) per centum of the contract price, of some approved surety company guaranteeing said improvement against defects arising from poor material or poor workmanship, for a period of five (5) years from the date of the completion and acceptance thereof.

H. P. PEARSONS,
President of the Board of Local Improvements of the City of Evanston.
Dated, Evanston, Illinois, Dec. 20, 1915.

Bids received until Jan. 5, 1916.

Wharf and Causeway

New Orleans, La., Dec. 3, 1915.

Sealed proposals will be received by the Board of Commissioners of the Port of New Orleans until January 5, 1916, at 8:00 p.m. for the construction of the Dumaine Street Creosoted Wharf and re-inforced concrete causeway with creosoted wood block roadway.

Alternate proposals are requested for bids, to wit:

Board of Commissioners of the Port of New Orleans furnishing all creosoted lumber and piling, or bidders furnishing all material and labor. Bidders will be allowed to submit proposals either way or both ways.

Deposit—$15,000.00 cash or certified check.

Payment—monthly to the extent of 80% of the Engineer's estimate of work accomplished, including allowance for a reasonable stock of material.

Bond—50% of the value of the contract.

On and after Dec. 6, 1915, plans and specifications will be on file at the office of the Engineer, J. Devereux O'Reilly,, by whom full sets will be furnished to prospective bidders on deposit of $20.00, which will be refunded to depositors who submit proposals and return sets in good condition.

To depositors not submitting proposals, $10.00 will be refunded on return of set in good condition.

The right is reserved to reject any and all bids, and to waive any informality in the bids received.

ERNEST M. LOEB, President.

Bids received until Jan. 22, 1916.

Street Paving

La Porte, Indiana.

Bids will be received by the Board of Public Works until 11 A.M., January 22, 1916, for paving Indiana Ave. and Michigan Ave. 38,000 square yards. Estimated cost, $110,000.

L. DREW GODDARD, City Engineer.

Bids received until Jan. 17, 1916.

Street Paving

BOARD OF LOCAL IMPROVEMENTS

City of Evanston,

Notice is hereby given that bids will be received for ing with brick on concrete portions of Bridge Street, Street, Country Road, Noyes Street, Dodge Avenue, Street, Brown Avenue, Grey Avenue, Hartray Avenu Pioneer Road, amounting to approximately 41,400 yards, as a whole, in accordance with the ordinance the Said bids will be opened on the 17th day of January, 1 the hour of 8 p.m., in the Mayor's office in the City Hall City of Evanston.

The specifications for such improvement and blank posals will be furnished at the office of the Commissio Public Works of the City of Evanston.

The Contractor will be paid in bonds, which bonds draw interest at the rate of five (5) per centum per a except payment (if any) to contractor by warrant again first installment, shall bear no interest.

All proposals or bids must be accompanied by a ce check payable to the order of the President of the Bo Local Improvements of the City of Evanston for a su less than ten (10) per centum of the aggregate of th posal. Said proposals or bids must be delivered President of the Board of Local Improvements in open of said Board at the time and place fixed herein for o the same. No proposal or bid will be considered unle companied by a check as herein provided.

The Board of Local Improvements reserve the right ject any or all bids should they deem it best for the good.

The successful bidder will be required to furnish formance bond equal to the contract and a Maintenanc equal to twenty-five (25) per centum of the contract p some approved surety company guaranteeing said im ment against defects arising from poor material o workmanship, for a period of five (5) years from the the completion and acceptance thereof.

H. P. PEARSONS
President of the Board of Local Improvements of th of Evanston.
Dated, Evanston, Illinois, Dec. 20, 1915.

Bids received until Jan. 12, 1916.

Turbo-Centrifugal Pump

Kansas City,

SEALED PROPOSALS will be received by the Purc Agent of Kansas City, Missouri, at the office of the Purc Agent, Second Floor City Hall, until two o'clock January 12, 1916, for the designing, construction, delive erection of a steam turbine, reduction gear, centrifugal ing unit of a capacity to pump continuously twenty (2 lion U. S. gallons of water per twenty-four (24) hours, a total combined head of three hundred and sixty (36 and a steam pressure of one hundred and sixty-five pounds per square inch at throttle; together with all ery, tools and appurtenances necessary; all in accordan the plans and general specifications on file in the office Chief Engineer of the Water Department.

Each bidder shall deposit with the City Comptr certified check in the amount of Seven Hundred an Dollars ($750.00), payable to the City Comptroller of City, Missouri, and accompany his bid with the Compt receipt therefor.

The certified check referred to in the Advertiseme be submitted by each bidder as a guaranty that the will, within ten (10) days after receiving the award of tract, file with the City a satisfactory bond to the am Twenty-five Thousand Dollars ($25,000.00) and will the contract.

The Board of Fire and Water Commissioners does r itself to accept the lowest or any bid offered, and reser right to reject any and all bids and to waive any irre or informality in the bids.

(Signed) J. P. LANGAN, Purchasing A
BURTON LOWTHER, Chief Engineer.

PROPOSALS FOR MOTOR SURVEY CRUISER—U. gineer Office, Chicago, Ill.—Sealed proposals for cons and delivering a motor survey cruiser will be received office until 10 A.M., Jan. 12, 1916, and then opened. I tion on application.

Bids received until Jan. 8, 1916.

Rebuilding Dams

Norfolk, Va., Dec. 23rd, 1915.

SEALED PROPOSALS will be received by the undersigned, until 1:00 P.M. Saturday, January 8th, 1916, for furnishing materials and labor for rebuilding three (3) Dams and Spillways.

Plans, Specifications, and Information can be obtained from the Engineer in Charge, Department of Water.

The Board of Control reserves the right to reject any or all bids.

T. B. DORNIN, Engineer in Charge. THE BOARD OF CONTROL.

POWER-HOUSES—U. S. Engineer Office, Wheeling District, Wheeling, W. Va.—Sealed proposals will be received here until 11 a.m. (Eastern time), January 22, 1916, and then opened, for building fireproof power-houses at Dams Nos. 16 and 17, Ohio River. Information on application.

LOCK GATES—U. S. Engineer Office, Wheeling District, Wheeling, W. Va.—Sealed proposals will be received here until 11 a.m. (Eastern time), January 14, 1916, and then opened, for furnishing and erecting steel lock gates for Dam No. 14, Ohio River. Information on application.

POWER-HOUSE—U. S. Engineer Office, Wheeling District, Wheeling, W. Va.—Sealed proposals will be received here until 11 a.m. (Eastern time), January 6, 1916, and then opened, for building a fireproof power-house at Dam No. 14, Ohio River. Information on application.

PROPOSALS FOR BOILERS—Office Quartermaster, West Point, N. Y.—Sealed proposals will be received here until 12 M. January 24, 1916, and then opened, for two Water Tube Boilers and Stokers. Further information on application.

U. S. ENGINEER OFFICE, Dallas, Tex.—Sealed proposals for constructing and delivering one steel barge designated "A" will be received here until 12 noon, Jan. 27, 1916, and then publicly opened. Information on application.

Bids received until Jan. 12, 1916.

Purchase of Air Dried Sludge

DEPARTMENT OF PUBLIC IMPROVEMENTS,
SUBDEPARTMENT OF HIGHWAYS ENGINEER,
Baltimore, Md., Dec. 15, 1915.

Sealed proposals, executed in duplicate, for the purchase of Air Dried Sludge, produced at the Sewage Disposal Plant at Back River, Baltimore, are hereby solicited and will be received, addressed to the Board of Awards, care of Richard Gwinn, City Register, at the office of the City Register, City Hall, Baltimore, until 11 A.M., January 12th, 1916. A certified check of the bidder on a clearing-house bank, drawn to the order of the Mayor and City Council of Baltimore, to the amount of $500.00, must accompany each bid. Specifications and blank proposal sheets can be had at the office of the Highways Engineer, City Hall, on application. The right is hereby reserved to reject any and all bids.

R. M. COOKSEY, Highways Engineer.

PROPOSALS FOR THE PURCHASE OF Locomotives offered for sale by The Panama Canal and which are no longer needed.—Sealed proposals will be received at the office of the General Purchasing Officer, The Panama Canal, Washington, D. C., until 10.30 a. m., February 11, 1916, at which time they will be opened in public, for purchasing the above-mentioned articles. Blanks and general information relating to this Circular (No. 1001) may be obtained from this office or the offices of the Assistant Purchasing Agents, 24 State Street, New York City; 614 Whitney-Central Building, New Orleans, La., and Fort Mason, San Francisco, Cal.; also from the U. S. Engineer Offices in the following cities: Seattle, Wash.; Los Angeles, Cal.; Baltimore, Md.; Philadelphia, Pa.; Pittsburgh, Pa.; Boston, Mass.; Buffalo, N. Y.; Cleveland, Ohio; Cincinnati, Ohio; Chicago, Ill.; St. Louis, Mo.; Detroit, Mich.; Milwaukee, Wis.; St. Paul, Minn.; Chattanooga, Tenn.; Louisville, Ky.; Mobile, Ala., and Galveston, Tex.; Commercial Club, Kansas City, Mo.; Chamber of Commerce, Quincy, Ill., and Commercial Club, Tacoma, Wash.—F. C. Boggs, Major, Corps of Engineers, U. S. A., General Purchasing Officer.

Classified Advertising

Positions Open
Civil Service Work
Employment Agencies
Labor Bureaus
Positions Wanted
Wanted
Agents and Salesmen
Contract Work
Business Opportunities
Miscellaneous
Educational
Books
For Sale
Proposals

RATES: Positions Wanted, 3 cents a word, minimum charge 50 cents an insertion, payable in advance. Other advertisements, 5 cents a word, minimum charge $1.00. Count 4 words for blind address care of our New York or Chicago offices. Advertisements for bids $3.60 an inch.

ANSWERS addressed to us at 10th Ave. and 36th St., New York or 1144 Monadnock Block, Chicago will be forwarded without charge (excepting circulars or similar literature)

IMPORTANT: Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents—send copies. Advertisers' names will not be furnished under any circumstances. Copy received until 10 A.M. Wednesday for next day's issue.

N

POSITIONS WANTED

Mechanical and Electrical Engineers

MECHANICAL AND CIVIL ENGINEER, experienced in design of metallurgical and chemical plants, power plants, conveying and storage equipment, general industrial plant work; good structural designer; available Jan. 1; references. PW186—Eng. News.

MECHANICAL ENGINEER, 35, technical school and 12 years' broad experience; New York interview. PW97—Eng. News.

Civil Engineers

CIVIL ENGINEERING STUDENT, experienced in surveying desires position; have own field and drafting instruments; location immaterial. PW92—Eng. News, Chicago.

GRADUATE CIVIL ENGINEER, 1915, 27, wants a job in railroad, hydraulic, bridge, etc., engineering; will go anywhere or do anything; experienced in city engineering work; references. PW153—Eng. News.

CIVIL ENGINEER, superintendent of a large water company, desires change; 15 years' experience in design, construction and management of hydraulic works. PW149—Eng. News.

CIVIL ENGINEER, 26, university graduate, three years' building experience including designing and estimating reinforced concrete desires to locate elsewhere. PW156—Eng. News.

CIVIL ENGINEER, 10 years' experience as draftsman, designer, inspector, estimator and chief of party on steel and reinforced-concrete structures, desires position with opportunity, outside work preferred; location immaterial. PW158—Eng. News.

GRADUATE CIVIL ENGINEER; 15 years' experience railroad surveys, location, construction, terminals, yards, designs, investigation reports and contract negotiations; Assoc. Mem. Am. Soc. C. E.—PW160—Eng. News.

CIVIL ENGINEER, Assoc. Member American Society, railroad valuation or maintenance work, graduate, 11 years maintenance and construction, two years Federal valuation, employed, desires change. PW21—Eng. News, Chicago.

CIVIL ENGINEER—New York concern about to effect changes wishes to locate suitable position for one of its engineers; young man, in charge of drafting and secretarial departments; location immaterial. PW171—Eng. News.

HIGHWAY ENGINEER, at present employed, open for change; large experience in municipal highway work, including old and modern types of pavements and road construction; good executive, expert on construction and repair costs and cost records; best references. PW172—Eng. News.

GRADUATE CIVIL ENGINEER, single, three years' field and office experience desires position; location immaterial. PW188—Eng. News.

CIVIL ENGINEER, graduate 1912, desires position in any branch of the profession; field, office and tropical experience; possess transit; can report immediately in any locality; salary moderate. PW187—Eng. News.

CONCRETE DESIGNER, 10 years' experience designing, detailing and supervising for various concrete systems, five years in charge of designing factory buildings. PW189—Eng. News.

CIVIL ENGINEER; technical education; eight years' experience field, office and design; railroads, maintenance and construction; Panama Canal construction, marine terminals, structures, concrete, reinforced concrete, steel, timber, reclamation, irrigation. PW183—Eng. News.

GRADUATE CIVIL ENGINEER, six years' field and office experience, desires position with opportunity; designer, building work, reinforced concrete and factory equipment. PW128—Eng. News.

CIVIL ENGINEER, 31, university graduate; 10 years' experience on railroad and industrial plant design and construction; now assistant superintendent with large contractors in Middle West; available after Dec. 15. PW127—Eng. News.

GRADUATE CIVIL ENGINEER, 1915, wishes employment in any branch of engineering where one can learn. PW181—Eng. News.

Bridge and Structural

STRUCTURAL ENGINEER, technical graduate, 14 years' experience in all classes steel structures, including bridges and subways, detailing, checking, estimating, designing, is open for engagement. PW157—Eng. News.

STRUCTURAL ENGINEER, 38, married, desires executive position with a responsible company; familiar with all classes of structural design, particularly power plant and buildings. PW180—Eng. News.

Draftsmen

ARCHITECTURAL DRAFTSMAN, 25 years old, university graduate, 3½ years' experience, desires position. PW192—Eng. News.

Surveyors

EXPERIENCED INSTRUMENT MAN, draftsman or computer desires position, going anywhere. PW169—Eng. News.

Superintendents

SUPERINTENDENT, engineer, 37, will fit any important post in contractor's office or field organization. PW701—Eng. News.

SUPERINTENDENT with 20 years' experience on pile driving, dredging, trestle and dock building, tunnel driving and lining, deep excavations, bridge foundations, locks, dams, hydro-electric developments, open for position. PW142—Eng. News, Chicago.

MUNICIPAL ENGINEER, university graduate; large and varied experience in municipal engineering and construction and an expert in plot development; city engineer of a large Eastern city for a number of years and in charge of all improvements. PW154—Eng. News.

CLERICAL MAN, 29, eight years' general construction experience, particularly large payrolls, cost accounting, correspondence; has initiative and executive ability. PW179—Eng. News.

EXPERIENCED QUARRY SUPERINTENDENT desires position after Feb. 1. Address "R. M.," 716 North Sixth St., Harrisburg, Penn.

MUNIPICAL ENGINEER, 20 years on surveys, planning, constructing and supervising highway improvements, pavements, etc.; good draftsman. PW178—Eng. News.

CONSTRUCTION SUPERINTENDENT and contractor's engineer with 15 years' successful experience in reinforced concrete and fireproof construction; thoroughly practical; progressive and efficient; field forces and plant organized; difficult and time propositions invited. PW185—Eng. News.

AMBITIOUS, ENEREGTIC STRUCTURAL DESIGNER, detailer and estimator with extensive experience on structural steel, reinforced concrete and timber construction, desires position; trusses, girders, bins, hoppers, trestles, highway bridges, furnaces, etc. PW168—Eng. News.

CONTRACTOR'S ENGINEER SUPERINTENDENT wants position Jan. 1; experience, foundations, caissons, buildings, bridges, sewers, dredging, railroad work. PW170—Eng. News.

SUPERINTENDENT OR FOREMAN desires position; wide experience, water sewers, state roads, etc.; strictly temperate; best references. PW184—Eng. News.

GRADUATE SHEFFIELD SCIENTIFIC, 1913, 35, drafting experience on railroad, structural, inspecting sewer construction, desires position with structural engineer, inside or outside; do anything to commence for later opportunity in structural designing; wages secondary to opportunity and permanency; references. PW161—Eng. News.

YOUNG MAN, graduate Cooper Union, 1915, desires position; salary secondary consideration. PW175—Eng. News.

POSITIONS OPEN

DRAFTSMEN—Good detailers wanted for condenser and heater work; location, Eastern New York State; give age, experience and salary expected. P173—Eng. News.

PHILADELPHIA BRANCH OFFICE of large Middle West manufacturing company has good opening for salesmen, designing engineers and draftsmen experienced in reinforced-concrete and other fireproofing materials; give full information P174—Eng. News.

DRAFTSMAN wanted, capable of using transit; desire a young man with experience. P126—Eng. News, Chicago.

DRAFTSMEN wanted, men of experience on heavy structural details of bridges, ore unloaders, and car dumpers; we can use both detailers and checkers. Apply by letter, giving full particulars, the Wellman-Seaver-Morgan Co., 7000 Central Ave., Cleveland, Ohio.

DRAFTSMAN (Marine) wanted for the Panama Canal; must be thoroughly experienced; salary, $125 month, with free steamship transportation from New York or New Orleans; no civil-service examination required for this vacancy; must be American citizen (final papers), under 45 years, physically sound. Write Panama Canal Office, Washington, D. C.

Civil-Service Opportuniti

Examinations for these positions will be held on or up to the dates g

UNITED STATES CIVIL SERVICE COMMISSION, WA TON, D. C.:

SANITARY ENGINEER (male); $1,600; examinat 19; for vacancy in Bureau of Science, Manila, P. I. Circular No. 35, Application Form B. I. A. 2.

STRUCTURAL ENGINEER AND DRAFTSMAN $1,000-$1,800; examination Jan. 19-20; for vacancy in Supervising Architect, Treasury Department, Wa D. C. Circular No. 53, Application Form 1312.

NAUTICAL EXPERT (male); $1,000-$1,800; exa Jan. 19; for vacancy in Hydrographic Office, Bureau gation, Navy Department. Circular No. 23, Applicati 1312.

ARCHITECTURAL DRAFTSMAN (male); $1,201-$ amination Jan. 22. Write to Civil Service Commis bany, N. Y.

Employment Agencies

The Agencies advertising here agree to refund any registration fee on mand any time within the first six months when no position is secu

H. H. HARRISON & CO., Association Bldg., Chica ters high-grade technical, semi-technical and comme from all parts of America.

STRUCTURAL AND AUTOMOBILE DRAFTSMEN The Toledo Engineering Agency, Ohio Building, Tole

CORRESPONDENT

THE UNDERSIGNED plans and conducts corres for positions in technical, manufacturing and pr lines for $2500 to $15,000 men exclusively. Complet assured. No commission charged—only service fee age. Send name and address only, in confidence, for details. R. W. Bixby (Established 1910), T1 Niagar Buffalo, N. Y.

BUSINESS OPPORTUNIT

CIVIL ENGINEER seeking capital to commercia patent. This is a big proposition for a big man BO190—Eng. News.

FOR SALE OR LEASE—Riveted steel pipe and pl located in Pittsburgh district on the Ohio River; pr kinds of plate work; dipping plant for steel pipe; of ground; 40,000 ft. floor space; good switching immediate possession. BO137—Eng. News.

MISCELLANEOUS

CONSULTING ENGINEERS will sub-let private use of outer office equipped with drafting tables, ographer, phone, all conveniences. Room 416, 38 New York.

PATENT ATTORNEYS

IMPROVEMENTS wanted; send for free bulleti manufacturers' wants and book "Inventions—Pate Promoting." Lancaster and Allwine, 272 Ouray Washington, D. C.

REINFORCED CONCRETE ENGIN
***and* STRUCTURAL STEEL DESIG**

who are competent to do the work in these branches of engineering **WANTED.** A correspondence course of instruction, prepared and c a well-known Consulting Engineer (after many years' experience in t branches of engineering) will fit you to find employment in the kind ng work that knows no "dull times." These courses provide "*actual*

Address W. 374, Engineering News.

Our Needs More Than Supplied

"In regard to our ad in your help wanted co which we instructed you to run for four insertion will ask you to kindly discontinue it at once and b for two insertions. We have received such a volu replies that our needs have been more than supplie therefore it will not be necessary for this ad to a again at this time."

"Positions Open" advertisements in Engineering News give employers quickly a choice among competent and experienced applicants.

For Sale
Second Hand Equipment

Rates: Less than 4 insertions 55 cents per line—4 to 11 insertions 50 cents per line—12 or more insertions 45 cents per line.
Equipment Wanted items appear at the end of this list.

N

ADVERTISERS' NAMES are abbreviated in most of these items. Complete names and addresses are as follows:

ARCHITECTS & Engineers Supply Co., Kansas City, Mo.
BRADEN, James S., 26 Cortlandt St., N. Y. City.
CONTRACTORS' Service Co., 50 Church St., N. Y. City.
DALLETT & CO., Harrison Bldg., Phila., Pa.
GIVIN Co., Herbert, 30 Church St., N. Y. City.
HOISTING Engine Sales Co., Grand Central Term., N. Y. C.
INTERNATIONAL Steel Erection Co., Waukesha, Wis.
JOBST, J. J., Peoria, Ill.—Equipment advertised is in good condition. Very cheap.
LINES FLYNN Co., Inc., 30 Church St., N. Y. City.
MARINE Metal & Supply Co., 167 South St., N. Y. City.
NEW RIVER Co., The, Macdonald, W. Va.
PIPE & Contractors Supply Co., 3 Dover St., N. Y. City.
SAMPSON Co., Geo. H., 13 Pearl St., Boston, Mass., and 32 B'way, N. Y. C.; or Winston & Co., Brown Station, N. Y.
SEYFERT'S SONS, Inc., L. F., 437 N. 3rd St., Phila., Pa.
SOUTHERN Iron & Equipment Co., Atlanta, Ga.
STALLEY, G. T., Box 390, Cleveland, Ohio.
TITAN Equipment Co., 30 Church St., N. Y. (Cort. 1111.)

AIR COMPRESSORS

2—Ingersoll-Rand, Cross Compound steam and air cylinders with Corliss valve gear 2500 cu. ft. capacity.—SAMPSON.

2—Ingersoll-Rand, Cross Compound Steam and Air Cylinders with Corliss valve gear 3300 cu.ft. capacity. Boilers and Condensers with this plant. All in good condition. Bargain.—SAMPSON.

Imperial XB-2 belt driven; 888 cu.ft. cap.; good as new.—SAMPSON.

Imperial XB-2 belt driven; 1190 cu.ft. cap. Nearly new.—SAMPSON.

Several second-hand air compressors, steam and belt driven, straight line and two stage of various sizes from 70 to 1300 cu. ft. capacities. Good condition.—SAMPSON.

1—Rand Class "C" 527 Cu. Ft. and 2—Rand Class "C" 98 cu. ft. straight Line steam Driven.—SAMPSON.

2 Laidlaw-Dunn-Gordon duplex 2-stage and 3 Norwalk tandem 2 stage, capacities 900 to 2100 cu.ft.—NEW RIVER.

American 10x10x10 straight line, steam driven, cap. 236 cu.ft.; Ingersoll-Rand 8x8x8 straight line, steam driven, cap. 100 cu.ft.; Clayton 8x8x7 duplex, cap. 150 cu.ft.—MARINE.

Ingersoll-Rand AA2, 18¼x20¼x13¾x18, 1110'.—GIVIN.

1—6x6 Ingersoll-Rand type NE-1 with regulating device; practically new, having been used less than two months. Address F. W. HAAS, Gary Public Schools, Gary, Ind.

Chicago (Franklin) portable gasoline 7x10, No. 3996, perfect condition, now in use.—INTERNATIONAL.

1 portable, gasoline driven, 80⁴ capacity.—GIVIN.

BOILERS

35, 50, 60 and 80 H.P. locomotive boilers.—PIPE.

4—125 H.P. and 2—150 H.P. Horizontal return tubulars, butt strapped, triple riveted.—MARINE.

4—225-hp. Geary water tube, at bargain prices for immediate disposal.—Apply Room 2405, Park Row Bldg., N. Y. C.

BRIDGES

Highway drawbridge for sale, for delivery in spring of 1916. Through span, 176' swing bridge, center support, 20' clear roadway, with one 4' sidewalk; steel trusses and floor beams with wooden stringers and floor plank; designed to carry one 40-ton car on one span; electric operation; built in spring of 1915. For further information apply to Holbrook, Cabot & Rollins Corp., 6 Beacon St., Boston, Mass.

BUCKETS

1—1 yd. Theo. Smith Orange Peel.—PIPE.

5—¾ cu. yd. standard clam shells.—STALLEY.

Hayward 1⅛ yd., Mead & Morrison 1½ yd., Smith 1 yd. and Union Iron Works ¾ yd. clam shells; 10—Steubner 1¼ yd. "Excelsior" bottom dump concrete.—MARINE.

¾ yd. Hayward Class "E" clamshell.—JOBST.

DERRICKS

Steel stiff leg, 125' boom, bull wheel, 35 ton.—TITAN.

1 Clyde stiff leg, 8 ton cap., 50' mast, 85' boom.—JOBST.

4 steel stiff leg—one 35' mast and sills, 88' boom, good for 6 tons with boom flat; one 25' mast and sills, 90' boom, good for 4 tons with boom flat; two 25' mast and sills, 85' boom, good for 15 tons with boom flat.—INTERNATIONAL.

DREDGES

12" hydraulic, fully equipped, with agitator, pontoons, pontoon pipes, shore pipe, electric light plant, galley and sleeping quarters for 10 men. Derrick scow with hand power. Must be seen to be appreciated. Apply to A. R. Powley Dredging and Construction Co., Kingston, N. Y.

DRILLS

1 Ingersoll-Rand E44, steam and air heads.—GIVIN.

ENGINES, GAS AND OIL

1 8 H.P. Vertical Type Fairbanks with sub-base.—SAMPSON.

ENGINES, STEAM

125 H.P. Brown Corliss.—METROPOLITAN CHAIR CO., New Haven, Conn.

EXCAVATORS

For sewers, cellars, grading, gravel plants.—TITAN.

GENERATORS

Western Electric 100 K.W. dir. con. to 14x14 engine, 240 volts; 2 Western Electric 60 K.W. belt, 125 volts.—MARINE.

HOISTING ENGINES

2—3 drum Nationals, one 10x12 and one 8¼x10, with boilers; Lambert 8½x10 D.D.D.C. Skeleton; 7½x10 D.D.D.C. Skeleton, 15 other makes and sizes.—MARINE.

12 Lidgerwoods and other makes, hoisting engines and cableways, skeleton and with boilers.—PIPE.

1—6¼"x8" D.C. D.D. with boiler and swinger "O. & S."—SEYFERT'S.

1 American hoist 8¼x10, with boiler, D.C. D.D. with swinging engine; 1 Clyde hoisting drum; 1 Lidgerwood hoist 8¼x10 with boiler, D.C. D.D. with swinging engine; 1 American hoist 7x10, with boiler, D.C. D.D.—JOBST.

1 American (steam) 24—5½x8, with 2 drums, 2 winch heads and boiler 28"x7'; 2 Lidgerwood (electric) double drum, 25 hp.—INTERNATIONAL.

15 hp., 220-volt, D.C. double drum hoist.—HOISTING.

INSTRUMENTS, SURVEYING

Second-Hand Transits, Levels, etc. Bought, sold or exchanged. Send for list of Second-Hand Instruments. Get our prices before ordering. WILLIAMS, BROWN & EARLE, Inc., Engineering Supplies, Dept. E, 918 Chestnut St., Phila.

$250 Stackpole V. arc Tr. No. 4, fine condn., $117. Guaranteed; 99 others. We repair, exchange, rent.—ARCHITECTS.

LOCOMOTIVES

[Standard Gauge]

50 locomotives, Switch, Mogul, Consolidation, Ten Wheel and Saddle Tank types.—SOUTHERN.

2—40 ton switchers, overhauled.—CONTRACTORS S. CO.

40-ton Climax geared, rebuilt; like new.—DALLETT.

2 switching locomotives: 40-ton Vulcan and 60-ton Baldwin.—PUBLIC BELT RAILROAD, New Orleans, La.

One Porter locomotive, 100,000 lb. capacity, cylinders 16x24; first-class condition. Reiter, Curtis & Hill, Commercial Trust Bldg., Philadelphia, Pa.

[40" and 44"]

Electric—11 Baldwin, Westinghouse and Goodman; weights 4 to 8 tons.—NEW RIVER.

[36" Gauge]

10 10x16" Porter, Davenport and Vulcans.—SOUTHERN.

5 9x14" Porters.—SOUTHERN.

5—10x16 Vulcans, 1911-12.—CONTRACTORS S. CO.

[24" Gauge]

1 General Electric Co.'s electric locomotive with 2 sets of 44-cell Gould batteries; weight 3 tons; G. E. motor, 85 volts. Rated draw bar pull 500 lb. on level track; speeed, 4 miles per hr.; including 1 battery charging rectifier panel, 220 volts A.C. Outfit used six months. Fruin Colnon Contracting Co., 502 Merchants Laclede Bldg., St. Louis, Mo.

LOCOMOTIVE CRANES

4 and 8-wheel, 10, 15 and 20 tons capacity.—HOISTING MACHINERY Co., 48 Church St., New York City.

4 and 8 wheel 10 and 15 ton.—CONTRACTORS S. CO.

15 ton excellent condition, cheap.—STALLEY.

4 and 8 wheel, 10, 15, 20 and 25 tons capacity.—GIVIN.

4 or 8 wheel 5 to 40 ton capacities.—TITAN.

15-ton four-wheel Industrial and 1½ yd. clamshell, $3,600.—Thos. J. Lane, 240 Bushnell Bldg., Springfield, Ohio.

MIXERS (Asphalt and Concrete)

Hadsel 2 yd. Batch with engine; Ransome ¾ yd. with engine and hopper; Foote Continuous No. 2½, 7½ H.P. motor, D.C. on wheels.—MARINE.

Portable plant, complete capacity 300-600 yds. per day, rare bargain.—LINES FLYNN.

1 Eureka continuous, 3 HP. D.C. motor; 1—2½ Smith and one ¾-yd. Ransome with engine on skids.—PIPE.

MOTORS

200 H.P. General Electric, 600 r.p.m., 3-phase, 60-cycle, 2200 volts. Run very little.—SAMPSON.

150 H.P. General Electric, 720 r.p.m., 3-phase, 60-cycle, 220 volts. Run very little.—SAMPSON.

PILING, SHEET STEEL

73 pcs. Lackawanna 14″ arch web, 35 lb. section, 22′ lengths, used once, excellent condition.—37 Dun Bldg., Buffalo, N. Y.

PIPE

Wrought pipe guaranteed, sizes ¾″ to 20″.—PIPE.

300,000 rethreaded wrought, sizes ¾″ to 24″.—MARINE.

Pipe fittings screwed and flanged 7″ to 18″.—NEW RIVER.

All sizes. Second-hand pipe or new mill seconds. Big stock. Prompt shipment.—Eagle Pipe Supply Co., 30 Church St., N. Y.

PUMPS

1 Cameron 3½x2x4 Steam pump.—SAMPSON.

Number of good pumps, various sizes.—NEW RIVER.

Cameron 10x10½x20 and other makes and sizes.—PIPE.

ROAD ROLLERS

1—10-ton gas macadam roller, latest type; little used; first-class condition.—FS176—Eng. News.

SEWER MACHINE

Side track Potter screw machine for sale cheap.—JAMES A. PRINGLE, Topeka, Kan.

SEWER PLANTS

Contractors plant comprising air compressors, mix bleways, pumps, cars, hoists, buckets.—LINES FLYNN

STEAM SHOVELS

Marion, model 60, steam shovel.—SOUTHERN

¾-yd. revolving traction, rebuilt.—LINES FLYN

70-ton Bucyrus, 2½ yd. dipper; Thew "O."—B

50 steam shovels, all makes and sizes; some used o months; rent or sale. Rare bargains. Everything guaranteed.—CONTRACTORS S. CO.

18-B Bucyrus traction, used few weeks; Type "O traction, Mass. boiler, prime condition.—DALLETT.

Thew Revolv. No. 0's, 1, A1, some factory rebuilt.—

1 Bucyrus ⅝ yd. revolving traction.—GIVIN.

TRACTION ENGINES

1 Advance, 12 HP.—PIPE.

Wanted

22 Theodolites—Two 30-second and twenty one- Good condition; reasonable price.—N. Escalante Co., St., N. Y. City.

Asphalt paving roller—Wanted at once. Price right. Send description and price to W177—Eng. Ne

Rock buckets—Two 1-yd. or 1¼-yd. for Marion shovels, Models 20 and 31.—Shongo Construction C Powers Bldg., Rochester, N. Y.

Bucket—Peerless crane and clamshell.—Cantrell C tion Co., 21st and Sedgley Ave., Phila., Pa.

Dragline machine—About 60′ boom, 1½ or 2 yd. Give full description, location and lowest price. Addre Box 93, Rochester, N. Y.

Contractors' plants and equipment bought for cas and Contractors Supply Co., 3 Dover St., New York.

FOR SALE—Second Hand Equipm

One 9 x 7½ x 8 Ingersoll-Rand Oil Burning Compressor complete with air receiver, fuel tank and circulating pump.
Two Little David and two Little Giant Wood Boring Machines.
One Cubic Yard Wylie Elevator Bucket, Receiving Hopp 120 ft. trussed chutes.
One 1-yd. Williams Clam-shell
One 7 x 10 single cylinder, sing Ridgerwood Hoist.
One ½-yd. Concrete Mixer wit boiler.

None of the above used over six weeks. Attractive prices to cash

F. S. 191, Engineering News.

Hydraulic Dredging Machinery FOR SALE

New York Ship Building Engine—Triple Expansion Marine Type 20″ Manganese Steel Pump—90 in. Impeller.

Boilers, Surface Condensers, Water Heaters, Blowers, Auxiliary Pumps, Hot Well, Electrical Equipment, Filter Tank, Grease Extractors, Gongs, Gauges, Etc.

This machinery has been in use but two seasons. Will sell all or any part of this outfit. For prices and further particulars address,

A. S. Richardson, Powers Bldg., Rochester, N. Y.

FOR SALE

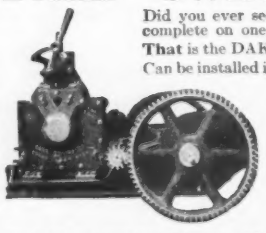
Air Compressors	Electric Locomotives	Pipe
Blowers and Fans	Elevators	Pumps
Boilers	Elevator Engines	Oil Separators
Buckets	Engines	Rails
Cars	Feed Water Heaters	Steel Pontoon
Derricks	Generators	Turn Tables
Drills	Grout Machines	Valves and Fittings
	Machine Tools	

Harold Carpenter, Resident Engineer, Astoria Light, Heat & Power Co., East 132nd St. and Locust Ave., New York City.

For *Speed* in Derrick Swinging

NO DEAD CENTERS

DAKE SWINGING GEAR



Did you ever see a 7-H.P. engine and swinging gear complete on one compact 42-in. x 46-in. base?

That is the DAKE.

Can be installed in any convenient place near main hoist or can be bolted to the skids in front of your double-drum hoist. The swinging drum is low, giving lots of clearance for the hoisting lines.

The compact DAKE square-piston motor for air or steam, has only two moving parts, and can't stick on a dead center. QUICK-ACTING—trouble-proof. **Write for the Dake catalog just out.**

DAKE ENGINE CO., Grand Haven, Mich.

Is there anythin you want?

—in line with your work—that cannot secured through the advertising in t issue:

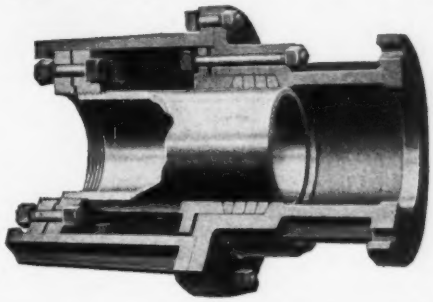
Equipment
New or used
Materials
Contracts
Work — Machinery — Supplies — Etc.
Bidders
Contractors — Manufacturers — Dealers Etc.—
Professional Service
Capital
Investment Opportunities
Labor
Employment
Technical or skilled Field or Office.

?

If so, write us. Any information we have is at your service.

ENGINEERING NEW

ROSS GUIDED EXPANSION JOINT



SOMETHING OLD—BUT NEW

THE ROSS EXPANSION JOINT consists of the well-known slip joint, with the improvement of a removable guide. This guide eliminates the strain that might be placed on the joint due to sagging of the pipe line, and thereby removes the only reasonable objection there has been to the slip joint type of expansion joint.

THE ROSS EXPANSION JOINT may be repacked, or packing adjusted, without removing it from the pipe line. No special tools are required. On account of the long traverse of the ROSS EXPANSION JOINT, the minimum number are required.

Built in sizes up to 24 in., and for working pressures up to 225 pounds.

COMPLETE INFORMATION ON REQUEST.

ALBERGER HEATER COMPANY

BUFFALO, N. Y. Manufacturers of Alberger Multi-Head Heaters CHICAGO, ILL.

Blawforms

With Blaw Light Wall Forms on the walls and foundations of Houses, Factories and Warehouses, Light Retaining Walls, etc. You do better work more quickly at less labor cost. They are both leased and sold.

Write for Blaw Bulletin 66-N. It tells the whole story.

There are Blawforms for every type of concrete construction from sewers to subways, from sidewalks to skyscrapers.

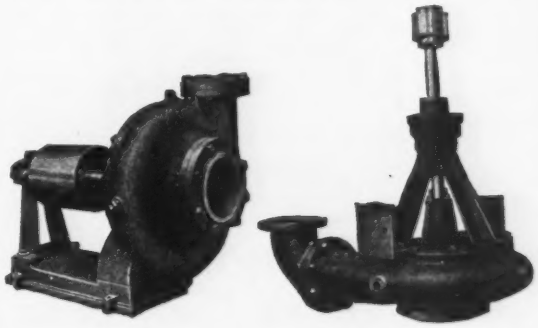
Blaw Steel Construction Co.

General Offices: Pittsburgh

New York, 165 Broadway
Chicago Peoples Gas Bldg.

Blawforms

WORTHINGTON



Class "C" Volute Pump

Horizontal or Vertical

Belt, Motor, Steam or Gas-Engine Driven

LOW IN PRICE

BUT

Embodies Scientific Design that makes it more Efficient than other low-priced pumps. Used principally for small Irrigation Plants, also by Contractors for unwatering Ditches and Cofferdams. Write for Bulletin W 601-19.

HENRY R. WORTHINGTON

115 Broadway, New York **Works: Harrison, N. J.**

Branch Offices in All Principal Cities

W264.2

A. D. Cook, Lawrenceburg, Ind.

Manufacturer of

Steam and Power Deep Well Pumps, Single and Double Acting, Cook's Patent Brass Tube Well Strainers, Deep Well Cylinders, Sucker Rods and Well Tools. Deep Well Pumping Systems installed complete.

Write for Catalog No. 11-6.

Cook Deep Well Products have always been manufactured by A. D. Cook. The Cook Well Company of St. Louis, Mo., a selling organization, has retired from active business and has transferred its good will to A. D. Cook. Customers of the Cook Well Company will receive direct service by writing to A. D. Cook, Lawrenceburg, Ind.

THE JOHN H. McGOWAN CO.

BUILDERS

M'G **PUMPING MACHINERY** M'G

IN ALL TYPES FOR ALL USES

CINCINNATI **OHIO**

GOULDS PUMPS

FOR EVERY SERVICE

THE GOULDS MANUFACTURING CO. SENECA FALLS, N.Y.

A Handy Compressor
Simple Compressor
Strong Compressor

10½-inch Westinghouse Cross-Compound Compressor as used in building construction.

Westinghouse
Steam Driven Compressor

Handy, because being compact it can be readily moved about and set up almost anywhere, no prepared foundation is required. It can be attached to a wall, a post, the trunk of a tree, the boiler of a hoisting engine, or a movable stand is provided.

Simple, because of its few parts and the ease with which it is operated. No expert attendance is required.

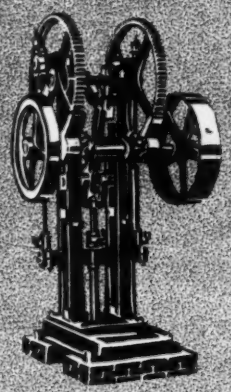
Strong, because of its self-contained mechanical construction. It will withstand very rough handling without injury

Westinghouse Steam Driven Air Compressors are made in both simple and cross-compound types.

SEND for our Compressor Book 9012.

Westinghouse Air Brake Co.
Pittsburgh, Pa.

New York City Investing Bldg. | Chicago Ry. Exchange Bldg. | St. Louis Security Bldg.



DOWNIE
DEEP WELL PUMPS

Are designed to lift large quantities of water from *deep* wells. They are built for unusually heavy service. *"Downie" Double Stroke Geared Pump Heads* with two *Downie Conical Plunger Valves* and two balanced lines of sucker rods have an efficiency of 85%. *Double Stroke Steam Head* efficiency, 65%. Single Stroke Pumps at 40 to 50% efficiency.

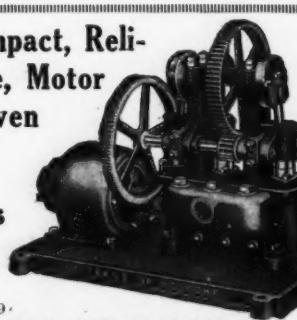
Catalog No. 6 gives details of our complete line. If you are interested in *well drilling* or *pumping* there is a *free* copy waiting for you.

Keystone Driller Company
Beaver Falls, Pa.

170 Broadway, New York | Monadnock Blk. Chicago | Carthage Mo.

DEANE OF HOLYOKE

Compact, Reliable, Motor Driven



Triplex Pumps

For General Service
Deane of Holyoke Quality

Send for Bulletin D204-19

INTERNATIONAL STEAM PUMP CO.
DEANE STEAM PUMP PLANT
Power Pump Manufacturers
Works: Holyoke, Mass. New York Office: 115 Bro
Branch Offices in All Principal Cities

Edson Diaphragm Pumps

Operated by Man or Gasoline Power

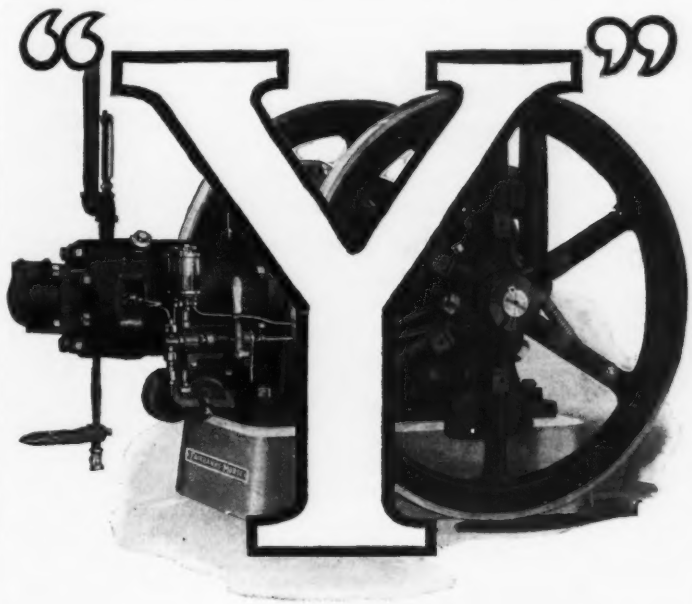
will handle Sand, Mud, Gravel, Sanitary Deposits and anything enough to flow, without clogging or injury. *Send for Descriptive Co*

Edson Manufacturing Company
Established 1859. 278 Atlantic Avenue, Boston

ATLANTIC
Diaphragm Pumping Engine

Send for Illustrated Catalog giving many styles with prices.

Harold L. Bond Co., 383K Atlantic Ave., B



OIL ENGINE

10-horsepower—
10 hours
for 30 cents

Fairbanks, Morse & Co.

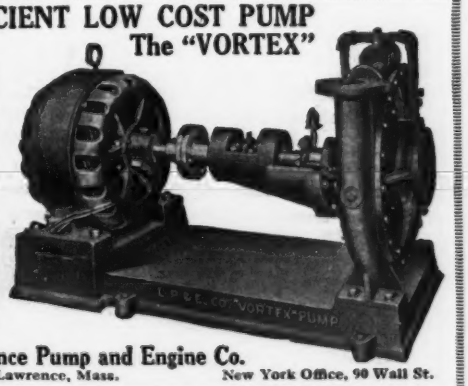
New York CHICAGO San Francisco

457-67B

AN EFFICIENT LOW COST PUMP
The "VORTEX"

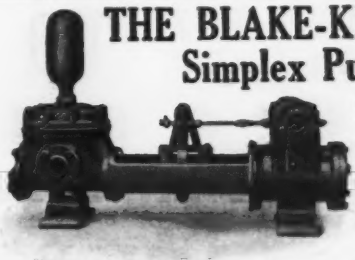
This 3-inch "Vortex" Pump with 15 H. P. Motor has a capacity of 250 gallons per minute and is built for any head up to 125 feet. Bearing surfaces are ample for permanent alignment. Absolutely no end thrust of shaft. No thrust bearings.

Get our Catalog showing the "Vortex" line of pumps



The Lawrence Pump and Engine Co.
P O Box 70, Lawrence, Mass. New York Office, 90 Wall St.

THE BLAKE-KNOWLES
Simplex Pumps



are best for your use, whatever the service may be.

Full lines for Pressure, Tank, Vacuum and air.

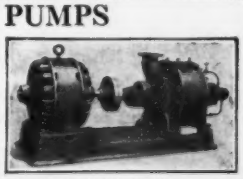
Write for Bulletin BK 876-19

The Blake & Knowles Steam Pump Works
115 Broadway, New York Works: East Cambridge, Mass.
Branch Offices in All Principal Cities. B252.1

ALBERGER PUMPS

With Centrifugal Pumps, whether of the Turbine or Volute Type, the name of Alberger is a guarantee of maximum service and minimum operating expense.

Write for Bulletins.



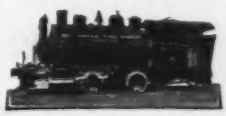
Alberger Pump & Condenser Co.
140 Cedar Street New York
Atlanta, Boston, Chicago, St. Louis, Pittsburgh, San Francisco.

Combustion in Vulcans

The proportions of Vulcan Boilers have been studied so carefully from the time the first Vulcans were built, that it has become possible to determine very closely just how much fuel a locomotive of a given type, in given service, and with a definite grade of fuel, will consume.

This is probably more important even in plantation, industrial and contracting work than in railroading, since these industries have frequently to pay higher prices for fuel, and have not, as a rule, the most capacious storage facilities.

Our locomotive engineering department will gladly show you how efficiently Vulcans may be made to burn cheap, low grade fuels.



VULCAN IRON WORKS
1736 Main St., Wilkes-Barre, Pa.
New York Chicago

Vulcan Locomotives

BRICK CHIMNEYS CONCRETE
FOR ALL PURSPOSES.

THE HEINE CHIMNEY CO.
123 W. Madison St., Chicago, Ill.

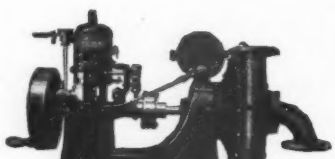
Branch Offices:
New York Boston Philadelphia Buffalo
Cincinnati Pittsburgh St. Louis Toronto

AMERICAN BLOWER COMPANY, DETROIT

Sirocco
TRADE MARK.

SHO
HEATI
VENTILA
AND COO
SYSTE

For the Modern Contractor



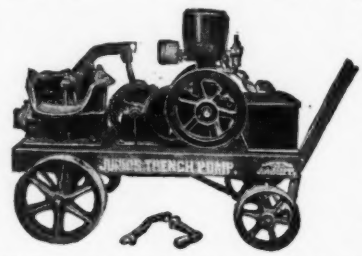
Lawrence Gasoline Engine direct-connected Contractor's Pumps are furnished either double or single suction, in sizes from 2" to 10" discharge. They are meeting with great success. Positive reliability and extreme ruggedness are noteworthy features. Our engineers will gladly assist you in selecting the best outfit for your needs. **Write.**

Lawrence Machine Co.

Lawrence, Mass. **30 Church St., New York**

Does the Work of Four Labor

The Junior Trench Pump will lift water cont
sand, gravel or sewerage. Can be operated for 7
on 1 gallon of
line with a
city of 3500 g
per hour. Bu
hard service.
diaphragm
can be fitted
outfit.



Send for Bo

A. A. Pa
Waterford,

(New England Agents: Perrin Seamans & Co. 57 Oliver St., Boston

Drive Your Generator With a Samson Turbine

You can save money if you will use a Samson to drive your generator because the Samson attains a quicker speed than any other turbine operating under the same conditions. This allows the use of lighter and consequently lower priced transmission machinery.

Samson turbines use the water economically; the speed is quick and steady; they develop great power. Write us today.

James Leffel & Co.

302 Lagonda St., **Springfield, Ohio**

20th Century Lift Systems

For Pumping Water—Anywh
CHEAPER

It's All in the Pu

Write for Bulletin 14-A for full de

HARRIS AIR PUMP CO.
Trustee.

INDIANAPOLIS, **IN**

Garbage Disposal Pla

Dryers, Condensers and Percolators. Elevators, Conveyors an

Complete Plants for Large or Small Cities.

THE C. O. BARTLETT AND SNOW CO., CLE OHIO,

KEYSTONE

Copper Bearing Steel Sheets

Black and Galvanized—most durable, rust-repellent sheets manufactured for Culverts, Flumes and Tanks; Apollo Roofing, Terne Plates, Etc.

AMERICAN SHEET AND TIN PLATE COMPANY, Pittsburgh, Pa.

AMERICAN SHEET & TIN PLATE CO. APOLLO BEST BLOOM TRADE MARK REGISTERED PITTSBURGH KEYSTONE COPPER BEARING

THE IMPROVED EQUIPMENT

60 Wall Street, New York City

COMBUSTION ENGINEERS

DESIGNERS AND BUILDERS OF

COMPLETE GAS PLANTS GAS BENCHES
LIME BURNING PLANTS GAS PRO
SPECIAL INDUSTRIAL FURNACES

WESTERN

Earth and Stone Handling Machinery

Air Dump Cars—Hand Dump Cars—Spreader Cars—Scrapers—Road Machinery — Portable Rock Crushers — Dump Wagons — Elevating Graders. Wagon Loaders and Ditchers. **Glad to send Catalogs.**

Western Wheeled Scraper Co. Farnsworth Ave. Aurora, Ill.

Foster Superheate

Increase capacity of boilers, give more power with fuel, and prevent all loss and trouble due to wet st

Power Specialty Co., **111 Broadway,**

As 18-K is to the Jeweler,

The mark **DARLING** is to the Valve User The **BEST**

THE DARLING PUMP & MFG. COMPANY, Lim.

Box E **Williamsport, Pa.** A-12

COATESVILL

BOILER WORKS

COATESVILLE, PA.

New York
30 Church Street

Philad
Morris

STEEL TANKS - BOILERS - ST

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

BABCOCK & WILCOX—STIRLING—RUST

WATER TUBE STEAM BOILERS

STEAM SUPERHEATERS
Works: BAYONNE, N. J.

MECHANICAL STOKERS
BARBERTON, OHIO

BRANCH OFFICES:

ATLANTA, GA., Candler Bldg. CINCINNATI, O., Traction Bldg. LOS ANGELES, I. N. Van Nuys Bldg. PITTSBURGH, Farmers' Deposit Bank Bldg.
BOSTON, 35 Federal Street. CLEVELAND, New England Bldg. NEW ORLEANS, Shubert Arcade. SALT LAKE CITY, Kearns Bldg.
CHICAGO, Marquette Bldg. DENVER, 435 Seventeenth Street. PHILADELPHIA, North American Bldg. SAN FRANCISCO, Sheldon Bldg.
SEATTLE, WASH., Mutual Life Bldg. HAVANA, CUBA, 116½ Calle de la Habana.

Elevated Steel Tanks

Hemispherical and Segmental Bottoms

Manufactured at Pittsburgh, Pa. Erected Anywhere

We have special designs for Municipal, Railway and Industrial service.

Catalog No. 7 sent upon request.

Pittsburgh-Des Moines Steel Co.

Pittsburgh, Pa., 801 Curry Building. New York City, 383 Hudson Terminal Bldg. Dallas, Texas, 1220 Praetorian Bldg. San Francisco, Cal., 2316 Rialto Bldg.

Des Moines Bridge and Iron Co., Des Moines, Iowa, 922 Tuttle Street.

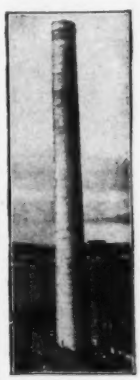
Elevated Water Tanks, Standpipes, Stacks, Pressure Tanks, Etc.

All kinds of plate steel construction

TIPPETT & WOOD

PHILLIPSBURG, N. J.

New York Office: 135 William Street



WEBER REINFORCED CONCRETE CHIMNEYS

CONIFORM AND CYLINDRICAL TYPES

HUNDREDS IN USE

Weber Coniform Chimney

Height, 180′ 6″ Inside Diameter, 11′ 0″
Built for Grand Trunk Pacific Railway, Prince Rupert, B. C.

The Weber Chimney Company

1453 McCormick Bldg. CHICAGO, ILL.

New York Office, 30 Church St.

WIEDERHOLDT CHIMNEYS

(PATENTED)

are built of the three strongest and most durable building materials known to the world.

Hard Burned Fire Clay
High Carbon Steel
Portland Cement Concrete

Hundreds in use and never one cent for repairs.

The most satisfactory and economical chimney ever produced.

Send for list of users and illustrations.

WIEDERHOLDT CONSTRUCTION CO.

620 Bank of Commerce Bldg. ST. LOUIS, MO.

Our Specialty is the
Design, Manufacture and Erection
of
ELEVATED STEEL TANKS AND STAND PIPES

For Municipal, Railroad and Factory Service. We also build oil tanks, coaling stations, bridges, turn tables, building and structural material.

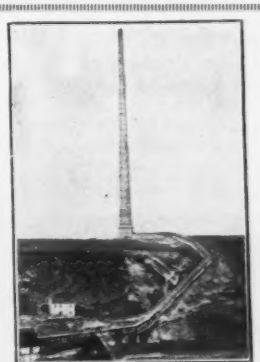
Write our nearest office today for catalog No. 10.

Chicago Bridge & Iron Works

Offices: Chicago, 37 West Van Buren St.
New York, 3111 Hudson Terminal Bldg.
Dallas, 1602 Praetorian Bldg.
Charlotte, N. C., 501 Realty Bldg.
Greenville, Pa., 110 Pine St.
Monticello, Fla., Box 367
Bridgeburg, Ont., Can., 110 Janet St.

Shops: Greenville, Pa. (Pittsburgh District)
Chicago, Ill.

Canadian Shop: Bridgeburg, Ontario



460 Foot Heinicke Chimney
Has Carried Acid Gases for 21 Years with No Decay Whatever.

H. R. HEINICKE

INCORPORATED

Perforated Radial Brick Chimneys

WRITE FOR NEW CATALOGUE

147 FOURTH AVENUE NEW YORK

Branch Offices
Drexel Building, Philadelphia, Pa.
142 Milk St., Boston, Mass.
8 Beaver Hall Sq., Montreal, Que.
Webster Building, Chicago, Ill.
Factory: Newcomerstown, Ohio

Railroad Shops!

When hardening axles and pistons on which so much of human life and safety depend, remember that

GAS is the RIGHT FUEL for MECHANICAL HEATING

It enables you to get the temperature desired *accurately* and to save time. We have wide experience in applying gas as fuel to carbonizing and hardening processes.

Let us cooperate with you on your problems. **Write us.**

American Gas Furnace Co.
Gas Engineers and Manufacturers
24 John Street New York

For Water Works an Sewage Disposal Plant

Wood Stave Pipe is ideal for most classes hydraulic distribution. It ordinarily outla steel and iron pipe and is from 20 to 60 per ce cheaper to install. Made from selected Wa ington or Douglas Fir, that resists the acti of acids and alkalies.

Perfectly adapted for either high or low pressu

WRITE US FOR DETAILS

Pacific Coast Pipe Co.
Manufacturers of Machine Wire-Wound and Continuous S Wood Pipe and Wood Tanks
Seattle Wa

Cast Iron Pipe

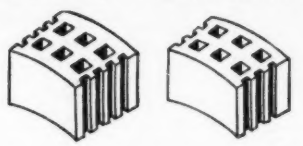
Bell and Spigot—Flange

For 58 years we have been manufacturing the highest quality cast iron pipe and special fittings.

Send us your orders. Our large stock, always on hand, guarantees prompt shipment. Write.

Warren Foundry and Machine Co.
Sales Office: 11 Broadway, New York
Works: Phillipsburg, N. J.

KELLOGG CHIMNEY



Built with hard burned radial brick molded with co gated sides that add 62½% to the strength of the joi A Kellogg Chimney has never failed.

Bulletin No. 60 gives valuable data.

THE M. W. KELLOGG COMPAN
90 WEST STREET, NEW YO
Chimneys and Welded Piping.

The following makers of Cast Iron Pipe and Fittings are independent of each other and competitors: inquiries may be sent to any or all of them with assurance of prompt and full service:

Donaldson Iron Co. Emaus, Lehigh Co., Pa.
American Cast Iron Pipe Co. Birmingham Ala.
Massillon Iron & Steel Co. Massillon, Ohio.
Lynchburg Foundry Co. Lynchburg, Va.
U. S. Cast Iron Pipe & Fdry. Co. Philadelphia, Pa.
James B. Clow & Sons Chicago, Ill.
Glamorgan Pipe & Foundry Co., Lynchburg, Va.

Perforated Radial Bri CHIMNEYS

BERGEN & LINDEMAN, Inc., 30 Church St., New
Branch Offices: Philadelphia, Boston.

Alphons Custodis Chimney Cons. Co.

RADIAL BRICK CHIMNE

Designed and Built—All Sizes and for All Purposes—Write for Free Catalogue No. 94

New York—Bennett Bldg.
Chicago—Marquette Bldg.
Philadelphia—Penna. Bldg.
Boston—Oliver Bldg.
Atlanta, Ga.—Healey
Pittsburgh, Pa.—Empire
Montreal—New
Toronto—Confederation Lif

American Pipe and Construction Co.
Water Works Engineers and Contractors
112 North Broad Street, Philadelphia
Also Manufacture
Welded Wrought Iron Pipe, Lined and Covered with Pure Cement and Having Lead Caulked Bell and Spigot Joints
The only noncorrosive pipe on the market good for any pressure.

STANDARD

Cast Iron Bell and Spigot and Flange
PIPE FOR WATER AND GAS
Standard Fittings Heavy General Foundry and Machine Shop
STANDARD CAST IRON PIPE & FOUNDRY
On Delaware River Bristol,

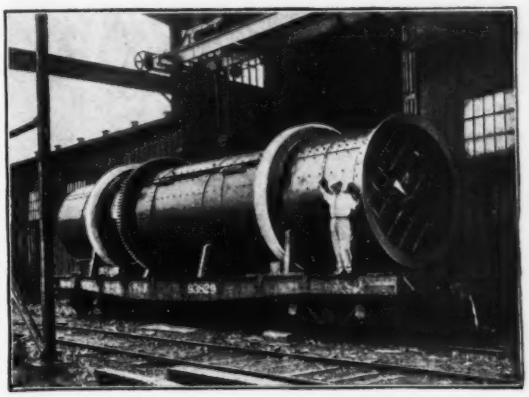
The T. A. Gillespie Company
Engineers and Contractors Manufacturers of
Lock-Bar and Riveted Steel Pipe
Pittsburgh, Westinghouse Bldg. New York, 50 Church St.

JAMES McNEIL & BRO. CO
LARGE SIZE RIVETED STEEL PIPE

Stand Pipe Iron Tanks Blast Furnaces
Self-supporting Stacks and Heavy Plate Work
Pittsburgh

Steel Plate Work

of every description for every purpose.



Stacks, Standpipes, Tanks, Penstocks, etc.

Send us drawings for estimate.

Kittoe Boiler & Tank Co.

Main Office and Factory, Canton, Ohio

Chicago Office, Fisher Building

LOCK BAR STEEL PIPE

100% efficiency at Lock Bar Joint. 15% Greater Carrying Capacity than Riveted Pipe. *Long Lengths* mean minimum joints.

LOCK BAR PIPE HAS NEVER FAILED IN SERVICE.

EAST JERSEY PIPE CORP., Riveted Pipe Tanks, Standpipes, Steel Linings

Fulton and Church Sts, New York City — *Send for Catalog* — Works: Paterson, N. J.

Look For **"National" Preparedness**

NATIONAL

A double-page announcement on this timely subject will be published in the January 6th issue.

Be sure to read it!

The Name **National Tube Company, Pittsburgh, Pa.**

R. D. WOOD & CO., Engineers, Iron Founders and Machinists

400 Chestnut Street, Philadelphia

Mathews' Single and Double Valve Gate Valves — FIRE HYDRANTS — Valve Indicator Posts

Manufacturers of All Kinds and Sizes of **CAST-IRON PIPE**

UNIVERSAL PIPE

—CAST IRON—

DOWN underneath the tracks is where your leak is apt to be if you didn't lay that line with

UNIVERSAL PIPE

Breaks and fractures of pipe lines from the vibration of heavy traffic are prevented by the moderately flexible joints of

UNIVERSAL PIPE

See A. S. M. E. Catalogue; or ask for Catalogue U-B and descriptive circulars.

CENTRAL FOUNDRY COMPANY

90 WEST ST. NEW YORK

CHICAGO - DALLAS - ATLANTA

SAN FRANCISCO

U-158

Erected at Porcupine, Ontario, Canad
A double line of 8′ diam. STEEL PIPE 1300 ft. long

STRUCTURAL AND STEEL PLATE WORK

is our specialty. We fabricate and erect from your drawings, or will design your structure for you.

No Work Too Large for us to handle in the minimum of time. May we estimate on your requirements.

Walsh's Holyoke Steam Boiler Work
Holyoke, Mass.

NATIONAL QUALITY

Wood materials cannot rust — Outwears iron, withstands extremes

PIPE City Water Systems Irrigation

TANKS Water, Oil or Acid

National wood stave pipe in sizes from 12 to 144 inches in diameter has proven absolutely satisfactory wherever used. Its lightness, cheapness and durability make it more desirable.

Booklet on request. Address Dept. D.

NATIONAL TANK & PIPE CO. 275 OAK ST. PORTLAND, ORE.

Look For NATIONAL

The Name

ARE YOU "NATIONAL" PREPARED?

"NATIONAL" PIPE prepares your lines every emergency.
A double-page announcement in the Jan 6th issue will interest every user of pipe.
Be sure to read it!

National Tube Company, Pittsburgh,

Steel for strength—wood for Durability.

"Michig

Combinati Steel and W Water Pipe

has all the vi of wood pipe the strengt

metal added. Full information in the Michigan Pipe Book. WR

Michigan Pipe Co. Bay City, M

Piping Facts of interest are contained in the Washington P. & F. Co.'s book. The knowledge of experts has gone into it—men who have a means of solving the piping difficulty that perchance now confronts you.

Today is a good day to send for your copy.

WASHINGTON PIPE & FOUNDRY CO.
1512-1620 Center St. and 3001-3019 Asotin St., TACOMA, WASH.

SHOES For Any Size—Any type Any Pressure Wood Pipe

Malleable Castings for all purposes

SHOES FOR ANY SIZE WOOD PIPE TO WITHSTAND ANY PRESSURE

The Marion Malleable Iron Works, Marion, I

Superior Wood Pipe

both continuous stave and machine banded, of Redwood and Douglas Fir. Also tanks. Write.

Pacific Tank and Pipe Co.

FACTORIES		OFFICES
San Francisco, Los Angeles	506 Fifth Street, 405 Equitable Bank Bldg.	San Francisco Los Angeles

---

Cut A illustrates banded pipe, not coated. Cut B illustrates completed pi
We build wood water pipe from 2" in diameter up to 48". For water wor municipalities, coal mines and chemical purposes. Write for our compl catalogue. Best quality—prompt attention—right prices.

Standard Wood Pipe Company, Williamsport, P

Look For NATIONAL

The Name

How the Grand Prize Was Awarded

A brief explanation of the **meaning** of the GRAND PRIZE which was awarded to "NATIONAL" PRODUCTS by the Superior Jury at the Panama-Pacific Exposition will be found on page... of this issue.

Read it now.

National Tube Company, Pittsburgh, Pa.

Portland is the Perfect Pi

Made of the finest old growth Oregon or Douglas Fir, Portland Wood Pipe is cheaper than iron or steel pipe yet of greater efficiency.

Portland Wood Pipe Co., Port Oreg

STRUTHERS-WELLS COMPANY
WARREN, PENNA.
Riveted and Welded Steel Plate Construction
New York Office: 50 Church Street
See our illustrated ad—in first issue of each month

SLUICE GATES
Shear, Flap and Butterfly Valves
FLEXIBLE JOINTS
COLDWELL-WILCOX C
NEW WINDSOR NEWBURGH N

Caulking Charges Cancelled

Bell-holes practically eliminated.
Trench pumping expense reduced to minimum. Work finished on time.
These are some of the advantages of using

TRADE **"LEADITE"** MARK

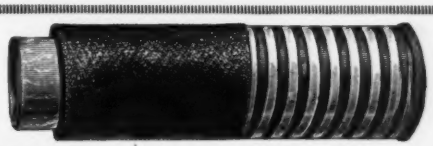
Registered U. S. Patent Office

For Jointing C. I. Water Mains

Leadite lessens labor. It fills every crevice from the yarn to face of bell. It is the efficient joint.

Write for booklet. Specify Leadite.
"Leadite Joints Increase In Strength With Age."

THE LEADITE COMPANY, Inc.
LAND TITLE BLDG. PHILADELPHIA, PA.



It Carries More Water for Its Diameter Than Any Iron Pipe

WYCKOFF WOOD PIPE is not impaired by the effects of electrolysis acid fumes or corrosion.
It is light, strong and very durable. Lengths, 6 ft. to 12 ft. long.
Size for size, it carries 14% more water than iron pipe.
Costs less for transportation because it is lighter and easer to handle.

May we send Catalog giving fullest details?

A. Wyckoff & Son Co., Elmira, N. Y.

Established 1855
Johnson-Peters Co., Pittsburgh Terminal Warehouse, Pittsburgh, Pa.
551 West 14th Place, Chicago, Ill.

"Let those now love, who've never loved before and those who always loved, now love the more."

LAMBERT WATER METERS

Long Life.
All parts interchangeable.
Lasting Accuracy.
Maintenance cost nominal.

Their merits have made meter systems popular.

A good article is always worth the price.

All improvements which the tests of time and long service show to be requisite in a **Perfect Water Meter**, are embodied in the **Lambert.**

ONE MODEL ONLY

Made in all sizes ¾" to 6" of best bronze Composition throughout, fitted with Unbreakable reinforced disc-pistons.

Illustrated Price List on Application.

Address

THOMSON METER CO.
100-110 BRIDGE STREET BROOKLYN, N. Y.

Roberts Filter Mfg. Co.

Darby, Penna.

WATER FILTERS for Municipal and Industrial Plants. Gravity and Pressure Types.

CHEMICAL DEVICES

NEW YORK CHICAGO

Keystone and Eureka Water Meters

COLUMBIA, S. C. SEATTLE

Pittsburgh Meter Co.
East Pittsburgh, Pa.

KANSAS CITY

"RENSSELAER" VALVES	"COREY" FIRE HYDRANTS
All Sizes	Valve Boxes
All Pressures	Indicator Posts
All Purposes	Air Valves

RENSSELAER VALVE CO.

GENERAL OFFICES, TROY, N. Y.
NEW YORK 180 Broadway CHICAGO, 1108-9 Monadnock Blk.
PITTSBURGH, 1016 House Building Seattle, 512 Colman Building

WATER SOFTENING AND FILTRATION PLANTS

AMERICAN WATER SOFTENER COMPANY
1000 CHESTNUT ST. PHILADELPHIA, PA.
No affiliation or working agreement with any of our competitors

---

Simplex Valve and Meter Company

Manufacturers of
WATER METERS for large pipes, Rate Controllers, Automatic AIR VALVES, REGULATING VALVES and HYDRAULIC APPARATUS of Special Design.

112 North Broad Street ..... Philadelphia, Pa.
New England Representative—Geo. W. Stetson, 141 Milk St., Boston, Mass.
Pacific Coast Representatives—Water Works Supply Co., San Francisco and Los Angeles. Diamond Bank Bldg., Canadian Representatives—Francis Hankin & Co., Montreal, Toronto and Vancouver, Canada.
See our large advertisement in the preceding and following issues.

VENTURI METERS

have proved their extreme accuracy in measuring cold and hot water, brine, chemical solutions, oil, air, gas and steam. See next week's full page advertisement. Write for Bulletin No. 84N.

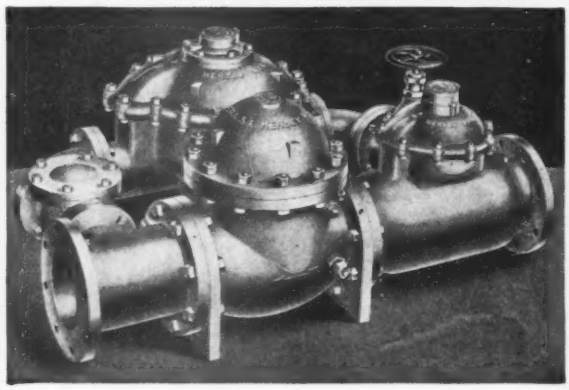
Builders Iron Foundry, "Builders of the Venturi" **Providence, R. I.**
New York Pittsburgh Chicago San Francisco Portland Seattle

PITTSBURGH FILTER MFG. CO.

PITTSBURGH, PA.

Contractors for Municipal and Industrial Filters, Water Softeners and Sewage Disposal Plants

Licensed Under Fundamental Negative Head Patents.



Stop Wholesale Losses
Use the Hersey Detector Meter on Fire Services

THIS METER HAS BEEN ACCEPTED WITHOUT RESTRICTION BY INSURANCE COMPANIES AND WATER WORKS IN MORE THAN 500 CITIES AND TOWNS IN THE UNITED STATES AND CANADA FOR USE ON MORE THAN 3000 FIRE SERVICES

PROTECTING NEARLY **$2,000,000,000** *WORTH OF PROPERTY*

HERSEY MFG. COMPANY

Main Office and Works, So. Boston, Mass.

Boston — New York — Philadelphia
Chicago — Columbus, O. — Atlanta
San Francisco — Los Angeles — Portland, Ore.

"ALL KINDS OF METERS FOR ALL KINDS OF SERVICES"
OVER 600,000 SOLD

HAI
Wag
Load

Saves you *per yard* in broken stone gravel, coal, etc. A tid you'll admit. 100 of these machines are doing it, and reducing labor les to a minimum, too. Electric or Gasoline Driven.

Further Details?
Geo. Haiss Mfg. Company, Inc., 142nd St. and Rider Ave., N
Also Carried in Stock at
Philadelphia — Cleveland — San Francisco — N

GRAVITY FILTERS PRESSU

For Municipal and Industrial Purposes.
Licensed For "Down Draft or Negative Head.
NORWOOD ENGINEERING COMPA
FLORENCE. MASS.

THE X-RAY FOR PUBLIC WATER SYSTEMS — TRADE MARK

THE COLE PITOMETER SYST

Water measurement and waste surve
THE PITOMETER COMPAN
25 ELM STREET, NEW YOR
N. Y. EDISON CO'S BUILDIN

Nicholas Engel

JOHN FOX & CO.

Cast-Iron Water, Gas and Flange Pipe, Special Castings, Fire Hydrants, Valves, General Foundry and Machine Work.

253 BROADWAY **NEW YORK CITY**

SLUICE GATES

Operated by hand, electricity or water. Gates for every purpose and for all pressures of water.

Catalogue 12-*A*

The Hinman Hydraulic Mfg. Co.
1400 W. Colfax Ave., Denver, Colo.

SLUICE GATES, CHECK VALVES, INDICATOR POSTS, ETC.

GATE VALVES **EDDY** **OUR LINE FIRE HYDRANTS**

Hydraulically and Electrically Operated Valves and Sluice Gates Valves Designed for all Kinds of Service.

EDDY VALVE COMPANY, WATERFORD, N. Y.
New York Chicago Boston San Francisco Philadelphia

THE "HOOKER" FIRE HYDRA

The "Hooker" is frost-proof with a dead air space between inside and outside case and sealed at the top and the bottom.

We also manufacture the " sewer receiver—contractor and castings. Handle li heavy machine jobbing wo

Ask for descriptions and prices.

McKim Foundry and Machine Co.. Lockport

GRAVITY and PRESSURE FILTERS

Hypochlorite Apparatus and Water Softening Plants.

Send fo Bulletin 15

THE NEW YORK CONTINENTAL JEWELL FILTRATION COMPANY
111 W. Monroe, St., CHICAGO. 313 E. Tenth St., KANSAS CITY, Mo. 15 Broad St., NEW

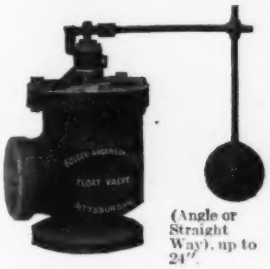
RAYMOND PULVERIZING AIR-SEPARATING SYSTEM

THE ACKNOWLEDGED ORIGINATORS OF AIR-SEPARAT

We manufacture specially designed Roller Mills, Automatic Pulverizers, Va Air Separators, Exhaust Fans and Dust Collectors for Grinding and Pulver

THE RAYMOND BROTHERS IMPACT PULVERIZER CO., 1313 N. Bra CHICAGO

G-A. Pat. Cushioned Controlling Altitude Valves
"Always Cushioned in Opening and Closing"



(Angle or Straight Way), up to 24".

Golden-Anderson Automatic Cushioned Float Valves.

For automatically maintaining Uniform Stage of Water in Tank, Reservoir or Standpipes. Doing Away with the Annoyances and Freezing of Float Fixtures inside or outside of Tanks.

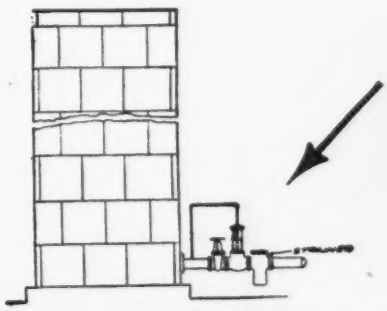
"Three Ways of Closing These Valves."

1st—Automatically by Water.
2nd—By Electricity, if desired.
3rd—By Hand.

"No Metal to Metal Seats"

Up to 24"

Golden-Anderson Patent Automatic Cushioned Water-Regulating Valves.



Golden-Anderson Valve Specialty Co.
1202 Fulton Bldg. PITTSBURGH, PA.

THE HOSE THAT LASTS

Let us send you full information.
The American Metal Hose Company, Waterbury, Conn

ROBINS CONVEYING MACHINERY

Our bulletins describe the successful solution of many materials-handling problems. Let them help you.

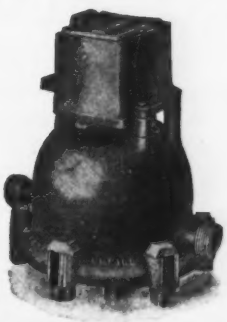
ROBINS CONVEYING BELT COMPANY
New York, 14 Park Row — Chicago, Old Colony Building
San Francisco, The Griffin Co. — Spokane, United Iron Works.
Toronto, Gutta Percha & Rubber, Ltd. — New Glasgow, Eastern Steel Co., Ltd., London, E. C., Fraser & Chalmers, Ltd.

THE PENN COUPLER

OUR latest development of the M. B. C. Coupler, a modification of our popular Pitt and Janney "X" Couplers, with latest improvements. **"Lock-to-the-Lock." "Lock-Set"** and **"Knuckle-Opener." Send for blue prints and prices.**

Manufactured only by
THE McCONWAY & TORLEY CO., Pittsburgh, Penna.

EMPIRE SUPERIORITY



THE LEADING WATER METER

UNRIVALLED FOR ACCURACY, DURABILITY, EFFICIENCY, LOW MAINTENANCE COST

NATIONAL METER COMPANY
84 CHAMBERS ST., NEW YORK
ESTABLISHED 1870 — JOHN C. KELLEY, PRES.
CHICAGO BOSTON CINCINNATI PITTSBURGH
LOS ANGELES SAN FRANCISCO LONDON

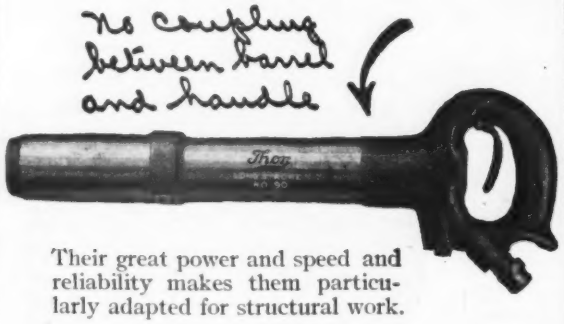
Here is the Hammer

that drove the rivets on the heaviest office building in the world.

Thor ONE-PIECE Pneumatic Hammers

Drove 1,500,000 Rivets on the

EQUITABLE BUILDING
IN NEW YORK



Their great power and speed and reliability makes them particularly adapted for structural work.

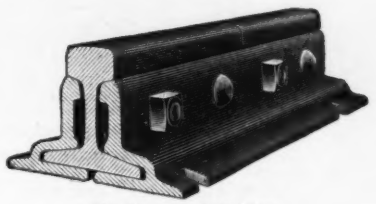
Shipped on Trial.

Independent Pneumatic Tool Co.

Chicago New York Pittsburgh San Francisco
Montreal Detroit Atlanta

The Rail Joint Compan

GENERAL OFFICES:
185 Madison Avenue, New York City



Continuous Rail Joint.

Makers also of Weber, Wolhaupter a 100% Rail Joints for Standard, Girc and Special rail sections. Also joi for frogs and switches. Insulated R Joints, and Step or Compromise R Joints.

Patented in United States and Cana

Catalog of Agencies

Boston, Mass.	India
Chicago, Ill.	Railway Exchange
Denver, Colo.	Equitable
Philadelphia, Pa.	Pennsylvania
Pittsburgh, Pa.	Oliver
Portland, Ore.	Wilcox
St. Louis, Mo.	Commonwealth Trust
Troy, N. Y.	Burden A
Montreal, Can.	McGill
London, E. C., Eng.	36 New Bro

THE "AUSTIN" LINE OF MACHINERY

Gyratory and Jaw Rock Crushers
Horse Drawn and Motor Road Rollers
Street Sprinklers and Sweepers
Elevating Graders and Dump Wagons
Road Graders and Scarifiers

AUSTIN MFG. CO., NEW YORK CHICAGO

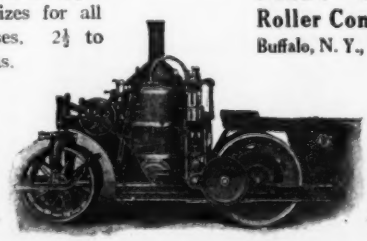
CANADIAN AGENTS: MUSSENS LTD., MONTREAL

Buffalo Pitts Rollers

Built for Service

Made in all types and sizes for all purposes, 2½ to 20 tons.

Buffalo Ste Roller Compa Buffalo, N. Y., U. S



Buffalo Pitts Double Drive Tandem Roller

Conveying
Elevating
Transmission
Machinery

Coal and Ash Handling
Chain and Sprockets
Sand and Gravel Washing
Contractors' Equipment
Rotary and Shaking Screens

The Webster M'f'g Company, Chicago New York **Tiffin, O.**

BACON \ FARREL
ORE & ROCK
CRUSHING \ WORLD KNOWN
ROLLS-CRUSHERS
EARLE C. BACON, ENGINEER
HAVEMEYER BUILDING, NEW YORK

PENNSYLVANIA METAL HOSE

Outwears rubber hose 10 to 1—as flexible but 30% lighter.

Write for booklet.

Pennsylvania Flexible Metallic Tubing Co.
Broad and Race Sts., Philadelphia
New York, Chicago, Boston, Los Angles, San Francisco, Houston, Seattle

Drill Cores For Sa

We sell diamond drill test boring service—accurate and reliable. Write us for booklet 4113.

SULLIVAN MACHINERY COMP
122 So. Michigan Ave.

Foote Concrete Mixers

For twenty years FOOTE mixers have been giving satisfaction on all classes of buildings and paving work. They are made in many different sizes and with special equipment for unusual jobs. Send for the Foote Catalogue.

-Address the Nearest Agent-

Foote Concrete Machinery Co., 106 So. LaSalle St., **Chicago, Ill.**
Wilcox Bros., Inc., 26 Roosevelt Ave., **Binghampton, N. Y.**
E. J. McHarg & Co., 3 Crandall St., **Binghampton, N. Y.**
W. C. McAnlis, Imperial Hotel, **Detroit, Mich.**
C. W. Klapproth, 30 Church St., **New York, N. Y.**
Edward R. Bacon Co., 51 Minna St., **San Francisco, Cal.**
Hallidie Machinery Co., 122 King St., **Seattle, Wash.**
Hodson-Feenaughty Co., 309 East Yamhill St., **Portland, Ore.**

(Made by Foote Mfg. Co., Nunda, N. Y.)

CAREY

Elastite

EXPANSION JOINT

"THE SANDWICH JOINT."

Elastite has many features. Perhaps the most prominent, is the increased compressibility secured by adding to the volume of the asphalt compound. It is kept in a solid body instead of being distributed throughout the joint in several thin layers.

Other features? Write—we will tell you and send a sample, too.

Street in Sioux City, Ia.

The Philip Carey Company

18 Wayne Avenue, Lockland, Cincinnati, O.

HUMMER

SELF-ROTATING

HAMMER DRILLS

for

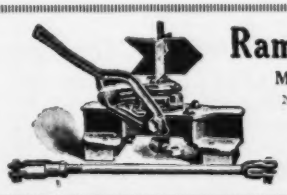
Mining	Hitch cutting
Shaft Sinking	Quarrying
Tunneling	Coal Mining
Drifting	Road building
Bench work	Trench work
Block holing	Ore Drilling

Breaking Boulders

Send for Bulletin 216. Just off the press.

Chicago Pneumatic Tool Co.

1039 Fisher Bldg. Chicago — Branches Everywhere — **52 Vanderbilt Ave. New York**

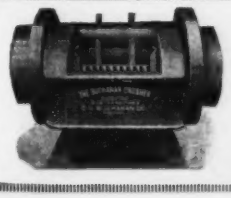


Ramapo Iron Works

Main Office, Hillburn, N. Y.

New York Office, 30 Church St.

Switch Stands, Plantation Cars, Switches, Frogs, Etc.



BUCHANAN All-Steel Crushers

CRUSHING ROLLS—MAGNETIC SEPARATORS

Crushing Plants complete in all details from 100 to 5,000 tons daily capacity.

C. G. Buchanan Co., Inc.

Main Office: 90 West St., New York, N. Y.
Branch: 1218 Chestnut St., Philadelphia, Pa.

Marion

REVOLVING SHOVELS

MARION Revolving Shovels, even small ones are Shovels of great capacity; they stick right to a job like a bullpup till the whole contract is out of the way—*that's what they are there for.*

Marions Get in and Dig—and Keep Right on Digging!

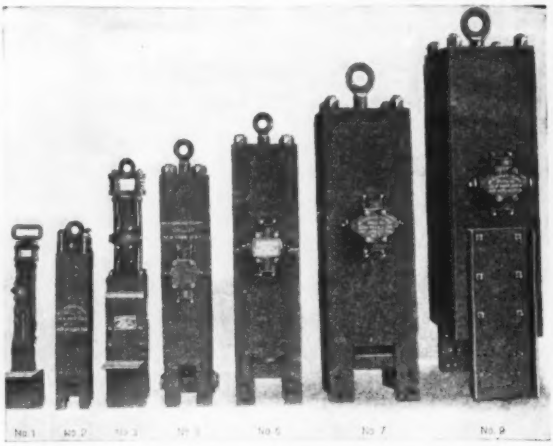
There's a Marion Shovel that will fit right in with *your* work. It's described and illustrated in "Marion Reliability and Your Profits" which we will be glad to send on request for Catalog 939.

MARION STEAM SHOVEL COMPANY

Established 1884 — **Station M, MARION, OHIO**

Atlanta Chicago New York San Francisco Seattle

Manufacturers of Excavating Machinery of Every Description



THE pile hammers shown in the above illustration will drive the lightest or the heaviest section of steel or wood sheet piling, or wood or concrete piles up to 18 inches square or round.

The high standard of excellence established by McKIERNAN-TERRY PILE HAMMERS is known to users the world over. Their reputation for consistent and economical work is the reason.

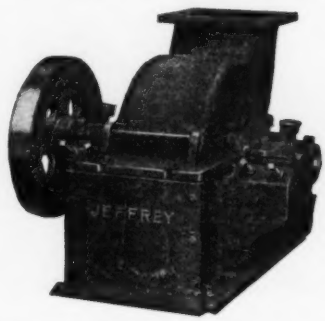
Before buying pile hammers for your next job, send for a copy of our new bulletin. Mailed to any address on request.

McKiernan-Terry Drill Co.

234 Broadway, New York, N. Y.

Can. Rep., Canadian Allis Chalmers, Ltd., Toronto, Ont.
Rock Drills, Core Drills, Hammer Drills, Atlas Jacks.
Foreign Representatives—British Steel Piling Co., London, Eng.

JEFFREY SWING HAMMER PULVERI



For Mill or Field Use—

Ready for a long, steady grind without repairs. Great strength but low power consumption.

The Adjustable Breaker Plate positively assures a uniform product.

Write for Bulletin 147-23 containing all details.

The Jeffrey Mfg. Co., Columbus

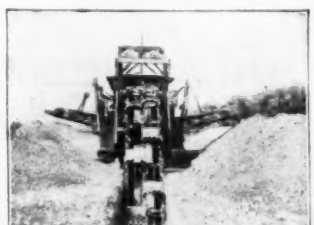
New York
Boston
Denver
Philadelphia
Pittsburgh
Montreal
Chicago
Clev
Milw
Birm

FLORY Hoists

FLORY HOISTS equipped with the Improved Patent Swinging Attachment, are unequalled for easy operation, reliability and durability. If you have hoisting to do, it will pay you to investigate.

Just write for Catalog No. 25.

S. Flory Mfg. Co.
Bangor, Pa.



Austin Trench Machi

are "full capacity" tors digging every minute of the day full bucket load bucket, every trip.

Our catalog No. 10 how you can dig trenc ditches easier and f cheaply. Our engin ready to co-operate v without obligation. nally the machines do the work Austi done are well worth gating. Write.

F. C. Austin Drainage Excavator

Railway Exchange, Chicago

WATERBURY WIRE ROPE

of Standard and Armored Construction. Manila and Sisal Cordage. Fibreclad Wire Rope. We make Ropes for every purpose. **Write for prices.**

WATERBURY COMPANY

63 Park Row, New York
Chicago, San Francisco, Dallas
Boston, New Orleans

The TERRY & TENCH CO.,

Bridge Builders, Manufacturers of Derricks, Erection plant and Shipyard Cranes. Contractors, Structural Steel erection.

Room 5717.

Grand Central Terminal, New York,

THEW SHOVELS

THEW SHOVELS

Remove concrete and macadam quickly and economically by use of the Thew prying motion. Read explanation of this and other Thew exclusive features in Circular I.

1200 Thews are in operation today. Write for Catalog "I" and List of Thew Owners.

THE THEW AUTOMATIC SHOVEL CO. LORAIN, OHIO

The OHIO Makes Good Everywhere

Over two years have elapsed since the purchase of the OHIO crane by the Babcock & Wilcox Company of Bayonne, N. J., who own and operate four different makes of locomotive cranes.

Every part has been given the service test by severe usage.

Not one part has been replaced that was defective or broken.

Do you wonder this OHIO made good?

Write for Catalogue No. 5.

O H I O

O H I O

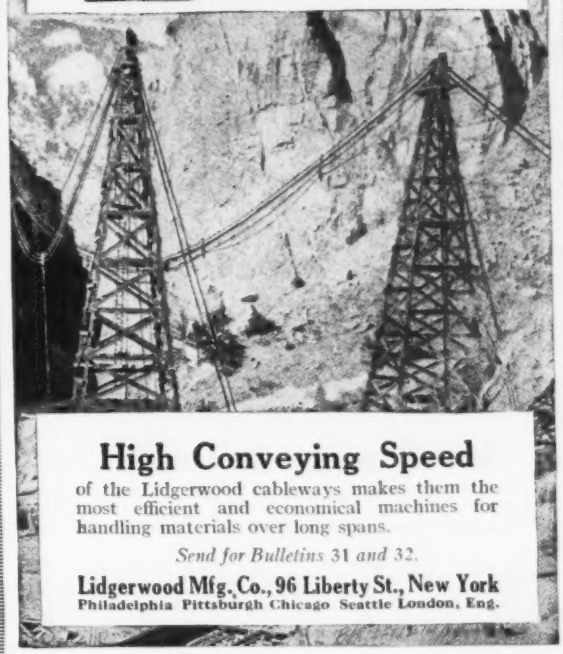
The Ohio Locomotive Crane Co.,
Mansfield St., Bucyrus, Ohio

30 Church St., New York
Fisher Bldg., Chicago
Home Life Bldg., Washington, D. C.
Oliver Bldg., Pittsburgh
Edward R. Bacon Co., San Francisco—Los Angeles
Contractors Equipment Co., Seattle, Portland
N. C. Walpole, Birmingham, Ala.
David Gaehr, 950 Rockefeller Bldg., Cleveland, O.
Kelly, Powell, Ltd., Winnipeg, Montreal

LIDGERWOOD

Steam and Electric

CABLEWAYS



High Conveying Speed

of the Lidgerwood cableways makes them the most efficient and economical machines for handling materials over long spans.

Send for Bulletins 31 and 32.

Lidgerwood Mfg. Co., 96 Liberty St., New York
Philadelphia Pittsburgh Chicago Seattle London, Eng.

Heavy Work Requires Good Equipment

INDUSTRIAL WORKS CRANES

Successfully take the Hard Knocks

Catalog 108 shows many photographs of our different machines erecting bridges and buildings and handling material.

Better write for this book now.

INDUSTRIAL WORKS, Bay City, Mich.

Steam Behind Gravity

—for—

Positive, Powerful, Driving

—quick, telling blows that are driving steel sheeting, wood piling, concrete piles, and pipe on the smallest as well as the most prominent foundation and underpinning contracts TO-DAY. And driving them better!

NATIONAL PILE HAMMERS

keep the pile moving in "live" soil — with no "brooming" or "slipping."

Send for our booklet H on pile hammers.

National Hoisting Engine Co.
Harrison, New Jersey

Traveling Cranes

For Power-House and every service. Electric and hand-power. Clearance diagrams and other information for initial layouts gladly furnished to engineers on request. Send for catalog.

We make Tainter Gate Hoists

Complete Foundry Plants

WHITING
FOUNDRY EQUIPMENT CO
HARVEY-ILL. U. S. A.
CHICAGO SUBURB

Cranes of All Kinds

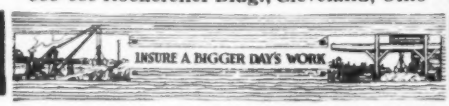
Proper Weight Distribution in Owen Buckets

Directly results in increased outputs. The greatest amount of weight is below the center, so that it **sits up** and **digs,** even when placed at extreme angles, as shown. This permits the Owen to dig where it would be impossible for some buckets; it entirely eliminates the necessity for re-"placing" the bucket, and is of very great value when dredging.

Hundreds of Owen Buckets are in use in all kinds of work. They invariably give satisfaction, and because of distinctive characteristics are being more rapidly adopted than any other bucket.

There are many reasons, all of which are explained in our literature, that will be sent upon request.

The Owen Bucket Co
533-535 Rockefeller Bldg., Cleveland, Ohio



FOR elevators, dredges, lumbering, mining, oil-well drilling, suspension bridges, stump-pulling, cranes, derricks, ships' rigging and every other form of wire rope use.

Ask for illustrated catalogue

American Steel & Wire Company
Chicago New York Cleveland Pittsburgh Worcester
Export Representative: U. S. Steel Products Co., New York
Pacific Coast Representative: U. S. Steel Products Co.
San Francisco Los Angeles Portland Seattl

Link-Belt Cranes
For Reliable Service

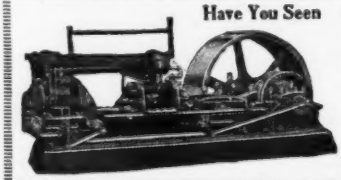
Link-Belt Company Phila Ch New

—In difficult work the—
O. S. Locomotive Cranes and Buckets
Insure satisfaction.

Correct Design
Right Material
Superior Fabrication

Orton & Steinbrenner Co.
CHICAGO, ILL.

THE SESSIONS FOUNDRY
BRISTOL, CONNECTICUT
SEWER and S
MANHOLE CA
Sewer Catch-B
Castings, Et
—TO ORD

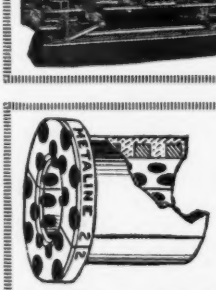


Have You Seen
The Norwalk I
Driven Compr
Full Load, Part Lo
Load, according to d
Don't be satisfied w
"as good" kind. Ge
The Norwalk Iron W
South Norwalk,

WE DIG EVERYTHING EXCEPT ROCK. IN BANK OR BELOW WATER LEVEL AT LOW COST.

Write for Catalog and state requirements.

The Cable Excavator Co.
Commercial Trust, Phila., Pa.



METALINE
(Trade Mark Reg.)
BUSHINGS for LOOSE PU
and similar places, positively avert the FIRE which is always present where o for lubrication.
THE METALINE COMPAN
Sole Manufacturers
6 West Ave. Long Island Ci

DEXTER
for
Service and Quality
Dexter Portland Cement Company
Nazareth, Penna.

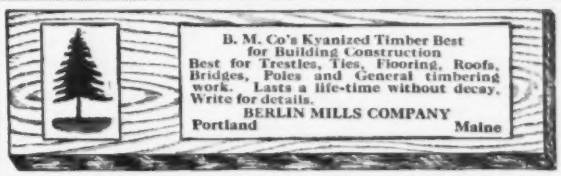
Old Dominion Portland Cement
Manufactured at Fordwick, Va.
Phoenix Portland Cement
Manufactured at Nazareth, Pa.
The finest ground, strongest cements on the market.
Prices quoted all points north and south.
Wm. G. Hartranft Cement Company, Sole Selling Agen
Real Estate Trust Bldg., Philadelphia, Pa.

WOOD PRESERVING

PILING—TIMBERS
TIES—WOOD BLOCKS

Your Specifications or Ours — Correspondence Solicited
THE BARBER ASPHALT PAVING CO., Maurer, N. J.

EPPINGER & RUSSELL CO.
Wood Preservers Since 1878.
CREOSOTED TIES, LUMBER AND PILES
Untreated Yellow Pine Lumber and Ties.
Works at Jacksonville, Fla.
Long Island City, N. Y.
Main Office:
165 Broadway, N. Y.


B. M. Co's Kyanized Timber Best for Building Construction
Best for Trestles, Ties, Flooring, Roofs, Bridges, Poles and General timbering work. Lasts a life-time without decay. Write for details.
BERLIN MILLS COMPANY
Portland Maine

LETTENEY IS LASTING
1867 **WOOD LETTENEY PRESERVATIVE** 1915
The oldest high boiling Coal Tar Wood Preserving Oil on the market.
Large or small lots shipped promptly.
THE NORTHEASTERN CO. BOSTON, MASS.

American Creosote Works,
New Orleans, La. (Station B)
Creosoted cross arms, Lumber, Paving Blocks, Piles, Poles and Ties.
Private free wharf for ocean vessels at New Orleans.
Capacity 100 million feet board measure annually.
Plants at New Orleans, La., and Louisville, Miss.

E. A. Buell, President. Edm. Christian, Eng. and Gen. Mgr.
Percy A. Smith, Asst. Mgr.
NORFOLK CREOSOTING CO.
Citizens' Bank Building, NORFOLK, VA., U. S. A.
A MODERN PLANT Adapted to filling the Most Rigid Specifications
Send for Descriptive Book—Spanish or English

Office: 30 E. 42nd St. New York City
Works: Portsmouth, Virginia
THE WYCKOFF PIPE & CREOSOTING CO.
Established 1881
SEND FOR CATALOGUE B
Creosoted: Railroad Ties, Bridge Timbers, Piles, Poles, Paving Blocks, Cross Arms, Lumber, WYCKOFF CONDUIT FOR UNDERGROUND WIRES; Also Wood Pipe and Steam Pipe Casings.

Parsons Trench Excavators
for excavating
Sewer, Water and Gas Main Trenches
Send for our latest Catalog
The Parsons Company, Newton, Iowa

Barrett's Grade One LIQUID **Creosote Oil**
Cuts Wood Preserving Bills in Half
Write for Booklet.
BARRETT MFG. CO.
New York
Branches in Principal Cities.

WHY *Avenarius* CARBOLINEUM PRESERVES WOOD EVERYWHERE
Simple methods—known costs—explained in new special circular—get it. Avenarius Carbolineum prevents decay of wood. Doubles life of timber. Costs 1/2 to 2c. per. sq. ft.—$5 to $12 per 1000 ft. B. M. Applied by brush, spray or open tank. 37 years' continuous service. Depots everywhere.
CARBOLINEUM WOOD PRESERVING CO.
181 Franklin St. New York 332 Prairie St. Milwaukee 161 Front St. Portland, Ore.

S. P. BOWERS CO.
112 N. Broad St., Philadelphia Spruce 4565
WHITE OAK and YELLOW PINE
Timber Piling Cross Ties
New York Representative
A. L. Richardson, 90 West St., Phone Rector 3749

TRENCH MACHINES
We sell and lease All Kinds of Hoisting and Conveying Machines for Trench Work.
Catalog Sent Upon Request.
Carson Trench Machine Co., Boston, Mass.
BRANCH OFFICES: Rose Bldg., Cleveland; 348 James St., Montreal.

CREOSOTED
Wood Block Paving Bridge Timbers
Ties, Poles, Piling, Cross-Arms, Conduit.
Also Ties Treated with Zinc Chloride.
Pittsburgh Wood Preserving Co. The Ohio Wood Preserving Co.
Michigan Wood Preserving Co.
OFFICE: Commonwealth Building, Pittsburgh, Pa.
PLANTS: Pittsburgh, Penna. Orrville, Ohio, Reed City, Mich.

Aetna Explosives

Quality
Efficiency
Prompt Service

High Explosives for every purpose.

Farming Dynamite, for sub-soiling, ditching, and tree-planting.

Black Blasting Powder.

Blasting Supplies of all kinds.

Permissible Powders passed by the Bureau of Mines, Department of the Interior:—**Aetna Coal Powder, Collier** and **Coal Special Powder** in all grades for all kinds of mines.

All made in our own factories under the supervision of experts.

Always at Your Service.

Aetna Explosives Company, Inc.
2 Rector Street, New York City

Successors to
Aetna Powder Company — Miami Powder Company
Keystone National Powder Company — and others

"CONCRETE FOR PERMANENCE"

CERTAINLY

the knowledge that you are dealing with positive qualities gives you an assurance that makes for resultful work.

In concrete structures the positive qualities—the known factors—are the absolute uniformity and acknowledged quality of Atlas Portland Cement. Over six million barrels of Atlas were used to build the Panama Canal—not *one* rejected.

PORTLAND ATLAS CEMENT

Business Established 1832

The Lawrence Cement Co.
No. 1 Broadway **New York**

Selling Agents for

Dragon
PORTLAND CEMENT

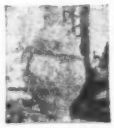
In Successful Use Upwards of a Quarter-Century

Book on request showing uses and testimonials

THE VARIETY IRON & STEEL WORKS
CLEVELAND, OHIO
BLAST FURNACES, PLATE WORK, BOILERS, FOUNDRY AND MACHINE WORK
AND STRUCTURAL WORK OF ALL K

Wisconsin Bridge and Iron Comp
Milwaukee, Wis.
Mining, Mill Buildings and Railroad Bridge
Branches:
1619 Monadnock Block Chicago, Ill. — 505 Moffat Block Detroit, Mich. — 510 Finance Kansas Ci

Pedestal Pile Foundations
Ask for 64-page Hand-Book—E. N.



MacArthur
Concrete Pile and Foundation Co.
11 Pine Street, New York
Chicago, San Francisco, Montreal, Boston, New Orleans, Atlanta, Detroit, Cleveland, Cincinnati.

A. J. MORSE & SON, Inc., 221 High BOSTON
Established 1837
DIVING APPARA
LATEST DESIGNS Orders filled day r
U. S. Navy Standard
Special apparatus built to order

NAZARETH CEMENT CO. NAZARETH PORTLAND CEMENT WORKS NAZARETH, PENNA.

SALES OFFICES:
New York, 1270 Broadway
Boston, 161 Devonshire St.
Philadelphia, 621 Arcade Building

SAMUEL H. FRENCH & CO. PORTLAND FRENCH'S CEMENT PHILADELPHIA, U.S.A.

FRENCH'S PORTLAND CEM
SAMUEL H. FRENCH &
PHILADELPHIA
ESTABLISHE

Check the Items—

What do you demand when you buy steel for concrete reinforcement?

Right price, right quality and quick delivery—you get all these when you order

"Franklin"

Steel for Concrete Reinforcement.

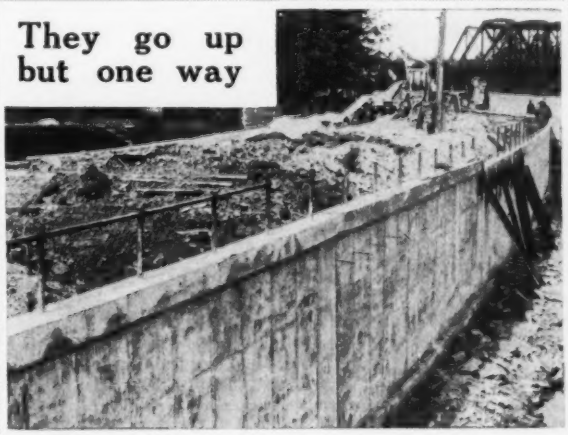
In addition you get that remarkable toughness and endurance in the steel which rail-steel must possess. We shall be glad to quote you. Also send you a copy of our interesting Bulletin which describes in detail the making of Franklin Steel for Concrete Reinforcement.

STEEL FOR CONCRETE REINFORCEMENT

FRANKLIN STEEL WORKS, Franklin, Pa., U. S. A.

Boston Office, 12 Pearl St.
Philadelphia Office, 411 Real Estate Trust Bldg.
Buffalo Office, Erie County Bank Bldg.
Fort Worth Office, 306 Western Natl. Bank Bldg.
Cleveland Office, 1320 Rockefeller Bldg.
New York Office, 30 Church St.
Chattanooga Office, 328 Carter St.
New Orleans Office, 207 Queen & Crescent Bldg.

They go up but one way



It doesn't take skilled labor or any experimenting to handle *speedily*

HYDRAULIC Pressed Steel FORMS

Made in interchangeable units—die cut to fit. They can go up but one way—the right way. The only tool necessary is a hammer—and if you don't have a hammer handy—use a brick.

Let us tell you what Hydraulic Forms will do for you.

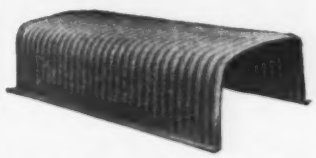
The Hydraulic Pressed Steel Co.
3152 East 61st Street, Cleveland, O., U. S. A.

Representatives:
New York, N. Y., Brown & Sites Co., 30 Church St.
Chicago, Ill., American Metal Form Co., 1205 Fisher Bldg.

Reinforcing and Metal Building Materials That Save Money

Self-Centering

Multiplex Steel Plates save concrete and minimize dead load in heavy service floor, roof, sidewalk and bridge construction. Concrete can be dumped right upon plates.



Reduce Cost And Dead Load

Pressed Steel Cores displace concrete and form concrete joists in light and heavy long-span floor construction. Removable or Permanent. Gauges 22 to 28. Depths 4" to 14". Lengths 30" and 36". Standard width, 20".

We Also Make

Rib-Truss Reinforcing and Furring Plates, for reinforcing thin concrete slabs for roofs, sidewalks, partitions and sidings; *Ferro-Lithic Reinforcing Plates* for reinforcing concrete slabs for flat or arched roofs and floors, sidings of buildings, sidewalks, etc.; *Berger's Expanded Metal Lath*, for stucco walls, partitions, ceilings, and every other kind of work requiring plaster; *Corner Beads*, for protecting exposed plastered corners.

Mention the products that interest you and write for our Special Catalog E. E. N.

The Berger Mfg. Co., Canton, O.

Address our Nearest Branch for Best Service:
Boston New York Philadelphia Chicago St. Louis Minneapolis San Francisco
Export Dept. Berger Building, New York City, U. S. A.

Painting Metal With
Dutch Boy
Red Lead-in-Oil

cuts down depreciation because this pure red lead *paste* sticks to metal and keeps out rust; stays soft and workable in the keg; spreads far and easily, forming a firm, insoluble coat on the metal. Send for booklet.

National Lead Company

New York Boston Buffalo
Cincinnati Cleveland St. Louis
Chicago San Francisco
Philadelphia (John T. Lewis & Bros. Co.)
Pittsburgh (National Lead & Oil Co.)

Westminster Ave. Bridge, Vancouver, B. C., painted with

NOBRAC

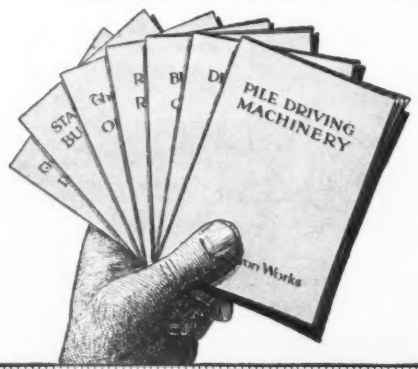
The "standing-up" qualities of "Nobrac," the Real protective paint, have been proven under the most severe conditions.

If you have steel structures exposed to all weathers—heat, cold, warm moist air, dry burning blasts—"Nobrac," coat them. Use the permanent protection.

The "Nobrac" Book tells of tests, experiments and experiences of Engineers with "Nobrac." We'll mail you a copy if you want it.

BPS

The Patterson-Sargent Co.
Cleveland, Ohio
Chicago New York St. Paul
Kansas City Dallas



Which One Shall We Mail?

The "Union" Books on Contractors' Equipment

The "Union" Line consists of Pile Driving and Excavating Machinery and Road Builders' and Contractors' Equipment.

We shall be glad to mail any one or all of the following books free to any address.

Book No. 4—Pile Driving Machinery.
Book No. 5—Derrick Excavators.
Book No. 10—Buckets, Cars and Contractors' Equipment.
Book No. 20—Road Builders' and Roofers' Equipment.
Book No. 21—The Eldus Asphalt and Oil Distributor.
Book No. 22—Standard Road Builders' Kettle.
Book No. 23—The Eldus Asphalt and Distributor with Heating Attachment.

Please refer to the books by number and ask for as many as you can use.

Union Iron Works
West Shore Station Hoboken, N. J.

For Over 55 Years
HENRY MAURER
FIRE BRICK, TILES AND BLOCKS
Have been STANDARD and used throughout the country in the largest Metallurgical and Chemical Works. Special size to suit requirements.

WRITE FOR PRICES.

HENRY MAURER & SON, Mfrs., 420 East 23d St., New York
Works: MAURER, N. J. Philadelphia Office: Penn Bldg

MORAVA CONSTRUCTION
ENGINEERS AND CONTRACTORS
Manufacturers of
STRUCTURAL STEEL
For All Purposes. STEEL BUILDINGS, BRIDGES,
Capacity, 25,000 tons per year.
General Offices and Works: 85th Street and Stewart Ave.
City Office: Suite 1043-1045, People's Gas Bldg. 150 Michigan Blvd., Chic

CONTRACTING ENGINEE
STEEL AND MASONRY CONSTRUCTION
PIERS AND SHEDS COALING PLANTS
Cable Address, Santee New York. Western Union & Lieber Cod
Cable Address, Pawnee Havana. Havana Office, Zulue
THE SNARE AND TRIEST COMPA
Woolworth Building, 233 Broadway Ne

RITER-CONLEY MANUFACTURING CO.

Designers Fabricators and Erectors Of STRUCTURAL AND PLATE WORK Of Every Description

Blast Furnaces
Bridges and Girders
Mill and Office Buildings
Gas Holders
Gas Works Construction
Ladles
Oil Refining Plants
Penstocks
Pipes (Riveted Steel)
Stand Pipes, Tanks and Towers
Steel Barges
Oil Tanks
Galvanized Transmission Towers

PITTSBURGH, PA.

Simplex Concrete Piling Co.

Tacony, Philadelphia, Pa.

LICENSEES

CRANFORD PAVING COMPANY, 2620 E St., N. W., Washington, D. C.
SIMPLEX FOUNDATION CO., 3400 Disston St., Tacony, Philadelphia
NEW ENGLAND FOUNDATION CO., 70 Kilby Street, Boston, Mass.
HURLEY-MASON CO., 623 Perkins Bldg., Tacoma, Washington
NATIONAL CONCRETE CONSTRUCTION CO., 54 Board of Trade Bldg., Louisville, Ky.
CRANFORD CONST. COMPANY, 609 Gerke Bldg., Cincinnati, Ohio
CRANFORD CONST. COMPANY, Keystone Bldg., Pittsburgh, Pennsylvania
SIMPLEX CONST. CO., Coristine Bldg., Montreal, Canada

Please communicate with nearest office.

J-M BUILDING & ENGINEERING MATERIALS

J-M Asbestos Prepared Roofing and Siding
J-M Corrugated Roofing and Siding
J-M Transite Asbestos Shingles
J-M Regal Roofing (Rubber-type)
J-M Mastic Flooring
J-M Water Proofing
J-M Water Proofing Coatings
J-M Asbesto-Sponge Felted Pipe Covering.
J-M Steam and Electrical Conduit
J-M Packings
J-M Asbesto-Metallic Brake Blocks
J-M High Temperature Cement for Setting Up Fire Brick
J-M Cold Water Paint—White or Colors
J-M Electrical Supplies

See our Page Advertisement in First Issue of Every Month.

H. W. JOHNS-MANVILLE CO.
New York and Every Large City.

JOHNS-MANVILLE SERVICE COVERS THE CONTINENT

FORT PITT BRIDGE WORKS

of Pittsburgh, Pa.

BRIDGES - BUILDINGS - STRUCTURAL STEEL

General Office, House Bldg., Pittsburgh, Pa. New York Office, 45 Broadway. Chicago Office, Fisher Bldg. Purchasing Dept. and Works, Canonsburg, Pa.

The BUCKEYE TROUGH FLOOR

IS THE BEST FOR BRIDGES, ROADWAYS OR SIDEWALKS. IS ALSO ADAPTED FOR FLOORS OF HEAVY WAREHOUSES, MACHINE-SHOPS, FIRE STATIONS, SIDEWALK AREAS, FIREPROOF BUILDINGS AND VAULTS.

THE YOUNGSTOWN IRON & STEEL CO.
Youngstown, Ohio

KENWOOD BRIDGE CO.

PAUL WILLIS, President A. J. T. BENNETT, Secretary

ENGINEERS AND BUILDERS OF STRUCTURAL STEEL WORK

OFFICE, 1416 FIRST NATIONAL BANK BLDG, CHICAGO

WORKS, GRAND CROSSING, ILL. TELEPHONE, RANDOLPH 1488

The Mount Vernon Bridge Co.

ENGINEERS AND MANUFACTURERS OF

Iron and Steel Mill Buildings and Structural Work
Railway and Highway Bridges, Roofs, Viaducts, etc.

MOUNT VERNON, OHIO

BERLIN CONSTRUCTION CO.

STEEL BUILDINGS BRIDGES STRUCTURAL WORK

Offices and Works,
BERLIN - - CONN.
220 Broadway, New York
Springfield, Mass.

EASTERN BRIDGE & STRUCTURAL CO.

WORCESTER, MASS.

BRIDGES AND BUILDINGS

SHERBROOKE, QUE., CANADA

BRIDGES, BUILDINGS, TANKS

Send us your inquiries for

Structural Steel and Plate Work of Every Description

MacKINNON, HOLMES & CO., Limited

CRANES For All Purposes Electric and Hand Power

Case Standard Cranes are the result of thoroughly tested ideas secured during many years from the best designing and operating engineers. They are manufactured under the most favorable conditions in a plant recently equipped at large expense for this particular purpose. They represent the greatest value for price charged.

The Case Crane & Engineering Co., - Columbus, Ohio

NEW ENGLAND COLUMN CLAMPS

Save 15% lumber and about 20% in cost of assembling. Brace the wall beam at the floor above. Clamps straighten and square the column in one operation.

Write for further particulars.

New England Column Clamp Co.

220 Devonshire Street, Boston, Mass.

Page Woven Wire Fabric

Ask us for prices on our special process reinforcing fabric. Look for the half pages alternating with this advertisment.

Page Woven Wire Fence Co.

Monessen, Penna.
W. N. Wight & Co., 5 Beekman St., New York, Eastern Representatives.

Blaw

STEEL BUILDINGS
BRIDGES—STEEL POLES
TRANSMISSION TOWERS

BLAW STEEL CONSTRUCTION CO.
General Offices and Works, Pittsburgh, Pa.
New York Office, 165 Broadway. Chicago Office, Peoples Gas Building.

Kinnear

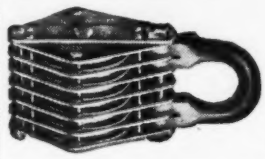
WRITE FOR CATALOGUE "M"

Steel and Wood
Rolling Doors and Shutt
New System of Glazing for Skyl

THE KINNEAR MFG. CO. COLUMBUS, O
BOSTON CHICAGO PHILADE

THE FERGUSON SNATCH BLOCK

(Patented May 22nd, 1906)
The newest thing in SNATCH BLOCKS as well as the *Simplest, Strongest* and *Safest*. They have the approval of practical men who are now using them in large quantities throughout the country. Cheaper than the Old Style Gate Block, and we think it a better block.
Catalog and Discount Sheet Sent on Request.
PITTSBURGH BLOCK & MFG. CO.
818 SOUTH AVE. N.S., PITTSBURGH, PA.



Star Brand Bloc
Are Standard
For any lift or difficult working co
they are safest, strongest and mo
able
Boston & Lockport Bloc
108 Condor St., East Boston,
New York City Chicago
33 South St. 413 Fort Dearborn
San Francisco 110 Market S

Missouri Valley Bridge and Iron Co.
LEAVENWORTH, KANSAS
Engineers and Contractors
For Bridges, both Substructures and Superstructures, Steel Buildings, Fireproof Wharves. Pneumatic and Open Foundations.

Capacity of Bridge Works, 75,000 Tons per Annum
THE PHOENIX BRIDGE COMPA
Engineers and Builders of
Bridges and Other Structures of Ste
Works: Phoenixville, Pa.—Established 1790.
Offices: 410 Walnut St., Philadelphia. 528 Pierce Building, St
49 William Street, New York. 901 Hurt Building, A
110 State Street, Boston. 26 Victoria St., Londo

LACKAWANNA BRIDGE COMPANY
CONSULTING ENGINEERS, DESIGNERS
MANUFACTURERS OF STEEL STRUCTURES
GENERAL CONTRACTORS FOR FIREPROOF CONSTRUCTION
NEW YORK, CHICAGO, BUFFALO, MILWAUKEE, HOUGHTON, MICH.
WORDEN-ALLEN COMPANY

MILWAUKEE BRIDGE COMPA
Engineers, Contractors, Manufacturers
STEEL FRAMED STRUCTUR
of all kinds MILWAUKEE,

STROBEL STEEL CONSTRUCTION CO.
1744 Monadnock Block
CHICAGO, ILL.
CONTRACTING ENGINEERS
STRUCTURAL STEEL WORK
BRIDGES TURNTABLES BASCULE BRIDGES

RIVERSIDE BRIDGE C
STEEL STRUCTURES
MARTINS FERRY,

The Strauss Bascule Bridge Company—Engineers
Specialists in MOVABLE BRIDGES, Designers of
STRAUSS TRUNNION BASCULE BRIDGES
and
STRAUSS DIRECT LIFT BRIDGES
104 South Michigan Avenue, Chicago

The Underpinning & Foundation Co. 290 Broa
New Yor
Difficult Foundations
Pneumatic, Steel, Concrete and Wooden Pile Foundations. Bridge Piers; Underpinning Heavy Buildings.
"HERCULES" STEEL PILES

STEEL BARS
FOR
REINFORCING CONCRETE
Manufactured by
LACLEDE STEEL COMPANY
ST. LOUIS, MO.
Works-Madison, Ill. Chicago Office: 332 S. Michigan Ave.

Established 1868 Incorporated 1886 Reincorporat
PENN BRIDGE CO.
BEAVER FALLS, PA.
Contractors and Manufacturers
Bridges, Buildings, Structural Work Of Every Descri
Shops—Beaver Falls and Claysville, Pa. Foundry and Machine Work *Capacity* 20,000 Tons Per

STRUCTURAL STEEL FOR THE WEST
With the advantages of favorable location, facilities for fabrication, experience in the business, we can give most prompt and efficient service for Buildings, Bridges, Tanks and Towers and all other kinds of steel work.
MINNEAPOLIS STEEL & MACHINERY CO.
Minneapolis Salt Lake City Denver Helena Spokane

Scherzer Rolling Lift Brid
embody all of the essential elements of up-to-date movable bridge
SIMPLICITY—EFFICIENCY—ECONONY
Write us for information, sketches and estimates
The Scherzer Rolling Lift Bridge Com
ENGINEERS
General Offices: Monadnock Block, Chicago
Cable address: Scherzer, Chicago, Eastern Office: 220 Broadway, N

McCLINTIC-MARSHALL COMPANY

Pittsburgh—New York—Philadelphia—Boston—Pottstown, Pa.—Columbus—Detroit—Chicago—St. Louis—San Francisco.
WORKS—PITTSBURGH, POTTSTOWN AND CARNEGIE, PA.

STEEL BRIDGES AND BUILDINGS

LARGEST INDEPENDENT MANUFACTURERS AND ERECTORS

OFFICES.
NEW YORK, N. Y., 71 Broadway
BALTIMORE, MD., Continental Trust Bldg.
BOSTON, MASS., 70 Kilby Street.
CHICAGO, ILL., McCormick Bldg.
MEXICO CITY, MEX., Edificio de "La Mutua"

THE PENNSYLVANIA STEEL CO.

BRIDGE AND CONSTRUCTION DEPARTMENT
STEELTON, PA.
DESIGN FABRICATE ERECT
STEEL STRUCTURES OF ALL KINDS

OFFICES.
PHILADELPHIA, PA., Morris Bldg.
SAN FRANCISCO, CAL., 1505 Chronicle Bldg.
ST. LOUIS, MO., Commonwealth Trust Bldg.
LONDON, ENG., 110 Cannon Street.
STEELTON, PA. At Works.

LEWIS F. SHOEMAKER & CO.

Steel Bridges and Buildings

45 Broadway, New York — Main Office and Works Pottstown, Pa. — 2 So. 15th St., Philadelphia

BELMONT IRON WORKS

Design - Fabricate - Erect
Steel Bridges and Buildings

Main Office and Works: Philadelphia, Pa.
New York Office: 32 Broadway - - - Bridge Shops: Eddystone, Pa.

AMERICAN BRIDGE COMPANY

HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes particularly BRIDGES AND BUILDINGS

Headframe and Idler Stand at Chisholm, Minn.

SALES OFFICES

NEW YORK, N. Y., 30 Church Street
Philadelphia, Pa., . Widener Building
Boston, Mass. . .John Hancock Bldg.
Baltimore, Md., Continental Trust Bldg.
PITTSBURGH, PA. . . Frick Building
Rochester, N. Y. . . . Powers Block
Buffalo, N. Y. . Marine National Bank
Cincinnati, Ohio. Union Trust Building
Atlanta, Ga. . . . Candler Building
Cleveland, Ohio . Rockefeller Building
Detroit, Mich., Beecher Ave. & M. C. R. R.
CHICAGO, ILL., 208 South La Salle St.
St. Louis, Mo., Third Nat'l Bank Bldg.
Denver, Colo., First Nat'l Bank Building
Salt Lake City, Utah, Walker Bank Bldg.
Duluth, Minn. . . . . Wolvin Building
Minneapolis, Minn., 7th Ave. & 2nd St., S. E.

Pacific Coast Representative:
U. S. Steel Products Co. Pacific Coast Dept.
SAN FRANCISCO, CAL., Rialto Building
Portland, Ore. . . . . Selling Building
Seattle, Wash., 4th Ave. So. Cor. Conn. St.

Export Representative:
United States Steel Products Co., 30 Church St., N. Y.

K & E
Surveying Instruments

Transits, Levels, Leveling Rods, etc.

are used on every big Engineering work. They are noted for their accuracy and durability and always represent the latest progress in the Design and Construction of Precision Instruments.

Our Catalog, listing every requirement of the engineer, sent on request.

KEUFFEL & ESSER CO.

NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO MONTREAL HOBOKEN, N. J.

Mathematical and Surveying Instruments
Drawing Materials Measuring Tapes

"KOH-I-NOOR
Tracing Cloth

Used by the Largest Consume Tracing Cloth in America

Thousands of rolls of "Koh inoor" are used yearly by Th General Electric Co., Penn sylvania Ry., N. Y. Centra Ry., American Locomotiv Works, Baldwin Locomotiv Works, U. S. Governmen and others who constitut the largest users of tracin cloth in this country.

There's a good reason fo this. One trial tells why

Write for sample and price to any of the following di tributing agents, viz.:

Favor, Ruhl & Co., 73 Barclay St., New York
New York Blue Print Paper Co., 58-60 Reade St., N
Schrell & Brock, 29 East 31st St., New York
J. H. Weil & Co., 1300 Arch St., Philadelphia, Pa.
Keystone Blue Paper Co., 910-912 Filbert St., P
Technical Supply Co., Scranton, Pa.
B. K. Elliott Company, 126 Sixth St., Pittsburgh,
Hirshberg Art Co., 418 N. Howard St., Baltimore
The Frederick Post Co., Chicago, Ill., and San
The Brooks Company, 715 Superior Ave., N. W
land, Ohio.
The H. Cole Company, 43 E. Long Street, Columb
The H. H. West Co., 385-387 East Water St., M
A. S. Aloe Company, 513 Olive St., St. Louis, Mo.
L. M. Prince, 108 W. 4th St., Cincinnati, O.

Current Velocity Measurement
with the
HASKELL CURRENT METER

assures you of accurate and dependable results under all conditions.

New Setback Velocity Register Saves Computation

Full details and catalog on request.

E. S. Ritchie & Sons
112 Cypress Street, Brookline, Mass.

Dietzgen

SAVE TIME — DELAY — MISTAKES

EUGENE DIETZGEN CO., Mfrs.

Measuring Tapes, Surveying Instruments, Drawing Materials

Chicago New York San Francisco New Orleans Toronto Pittsburgh

WRITE FOR CATA

Blue Printing Machinery

Our new 1915 Model is now ready.
Continuous printing, washing and drying; utmost speed and economy. Engineering Supplies.

Williams, Brown & Earle, Inc.
918 Chestnut St., Dept. E. Philadelphia

GURLEY

Engineering Instrume

Civil Engineers will be interested in the new Catalog. Write for it.

W. & L. E. Gurley Troy,

Snead Architectural Iron Works

LOUISVILLE, KY.

STRUCTURAL STEEL and ORNAMENTAL IRON

Send for Catalog BX-10 of

Precision Engineering Instrum

WM. AINSWORTH & SONS | THE PRECISION FACTORY | DENVE U.S

The special expansion joint and gas cutoff used between the thin partitions and the end walls of the Imhoff tanks, shown in section in Fig. 1, was very successful. This varies somewhat from the original design described in the article previously mentioned. This form of joint was designed to anchor the metal lath to the end walls during construction. A groove was built in the end walls along the line of the partition and in the center of this groove wrought-iron rods with flattened ends were embedded at intervals in the concrete. Short pieces of ¾x¾-in. steel angles were fastened to the edges of the rib-trus plates opposite each rod, to serve as lugs for anchoring the sheet-metal reinforcement. Tension was applied to the sheets by driving a taper pin or wedge into the hole in the flattened end of the rod, which caused the washers and pipe spacers to be wedged over against the steel angle lug fastened to the sheets. After the cement mortar in the thin walls had set, the pins were pulled out, leaving the partition walls free to contract without cracking. In nearly every instance these joints have opened up and but few cracks occurred in the thin walls themselves. The thin walls are 90 ft. long, with permanent supports every 10 ft.

The same type of thin-wall construction was used for the outside walls in the sprinkling filters (see Figs. 2 and 3), and the results are very satisfactory. It was specified that the surface of the wall should be left rough and no trowel finish applied. This was done with the idea that sewage running down over the rough face of the wall would be purified to a greater extent than if the wall surface was smooth. The earth backfilling on one side and the broken-stone filtering material on the other were placed at about the same time, and were carried up evenly on each side to prevent excessive pressures on the thin wall. The wall serves to keep sand and gravel from being washed into the broken stone, and with the earth backing acts as a retaining wall for the stone. For the conditions at Fitchburg, where the filters were constructed largely in excavation, this form of wall proved to be more economical than any other form considered. A concrete curb 12 in. wide and 14 in. deep was cast on the exposed edge of the thin wall to add a finish and make it more durable. The total cost of the sprinkling-filter wall, exclusive of earth backing, was approximately $3 per lin.ft., which for a height of 10 to 11 ft. is very low. The earth backing came from the filter excavation and cost practically nothing in addition, as embankment, to what it would have cost with the remainder of the excavation, which had to be placed in spoil banks some distance away. The cement-gun proved very advantageous to the contractor in this work on account of the extent of the plane surface to be plastered.

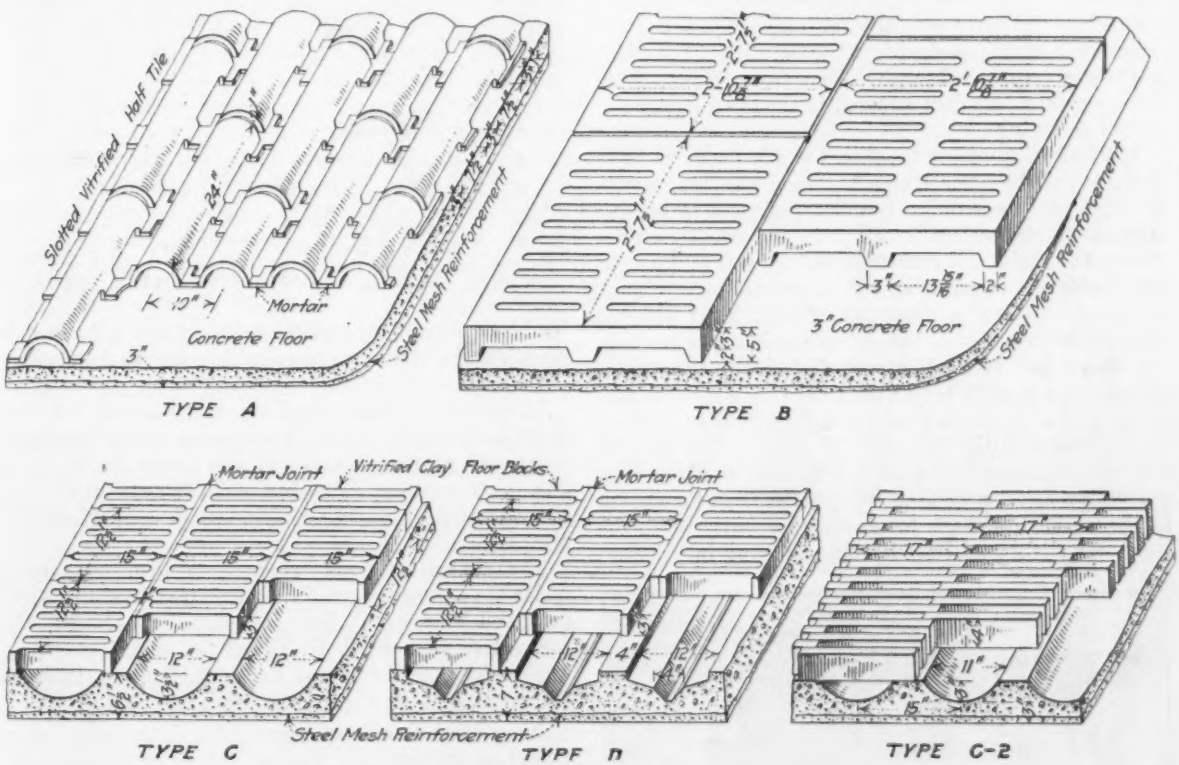


FIG. 4. TYPES OF SPRINKLING-FILTER FLOOR SYSTEM

(Bids were received on Types A to C. Type C was chosen, but, for reasons stated in the text, Type C-2 was used)

When bids were received for the construction of the sewage-treatment works four types of sprinkling-filter floor system were submitted to the contractors. These are illustrated in Fig. 4. The prices per square yard complete quoted by the R. H. Newell Co. and N. S. Brock, to whom the contract was awarded, were as follows: Type A, $2.90; Type B, $3.20; Type C, $2.60; Type D, $3.20.

Type C was selected as being the cheapest and at the same time one of the most desirable. Before constructing the floor the contractors encountered a serious difficulty on account of the failure of a clay-goods concern to furnish the vitrified clay blocks required at the original price quoted, and accordingly a new design was brought out, which was substituted for Type C. This design (Fig. 4),

Type C-2, is similar to one of the alternate designs made by Metcalf & Eddy for Gloversville, N. Y. The small cement blocks, 17 in. long by 1⅛ in. thick and about 3¾ in. high, were constructed of cement mortar composed of 1 part cement and 2 parts granite dust, mixed to the consistency of thick cream and poured by hand in gang molds and then stored in tanks under water for about 24 days. The blocks were set in place (Figs. 4 and 5) in a thin bed of mortar. With this type of floor system 43% of the floor surface is drainage area. The flat floor offers a good surface for construction purposes, and the flow is confined in good channels, which can be readily flushed and cleaned.

The filter excavation was largely in coarse sand and gravel containing many small cobbles 2 to 3 in. in diameter. A layer of these was placed on top of the small concrete floor-beams to act as a guard against "splinters" of stone dropping down between the beams or into the floor channels. The same difficulty, although to a much less extent, was experienced with the remainder of the stone, which was trap rock brought in on cars. Especially in damp weather, fine dust adhered to the stone in spite of careful screening.

The broken stone for the filters was intended to be of such size as to be retained on a 1-in. ring and pass through a 2-in. ring. Some difficulty was experienced in keeping the size of stone within these limits. Apparently a sieve having 1-in. holes and operated carefully will retain some pieces of stone as small as ½ in. in maximum dimension, and similarly a sieve having 2-in. holes will not pass all of the stone having a maximum dimension less than 2 in. It would appear desirable to use screens having holes slightly larger than the ring sizes specified. About half of the stone used was a local granite obtained from Rollstone Hill.

Four 4-ton gasoline auto trucks were used to haul the stone a distance of about three miles from the quarry to the work. Although the roads were fairly good, the stone was shaken up considerably, resulting in grinding

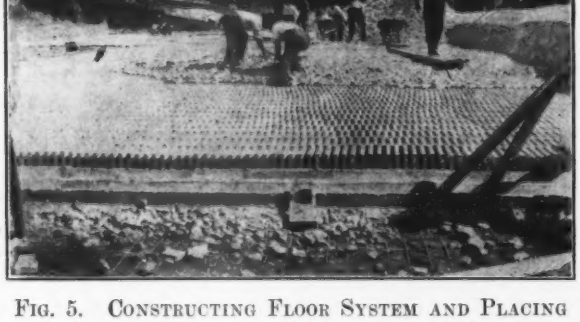


FIG. 5. CONSTRUCTING FLOOR SYSTEM AND PLACING COBBLES, SPRINKLING-FILTER FLOOR SYSTEM

and breaking, and it was found necessary to screen the stone again at the filter site to remove fine material thus produced as well as that escaping from the main screening plant. It is believed that better results would have been obtained if the stone had been both screened and thoroughly washed.

The distribution mains in the sprinkling filters, comprising 17 lines of 16- and 12-in. cast-iron bell-and-spigot pipe jointed with lead joints, were laid just below surface of the stone, in order that the nozzles migh screwed directly into tapped holes in the mains thereby obviate the necessity of using riser pipes. A cial drilling machine was used for drilling and tap these holes. The machine was fastened to the pipe chain passing around the pipe. The spindle carryin drill and tap was set plumb by means of a machi

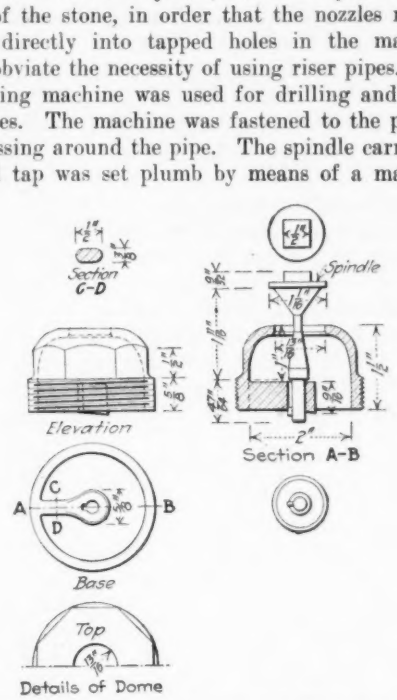


FIG. 6. DETAILS OF SPRINKLING-FILTER NOZZ

level held against the vertical guide on which the sp moved, and metal shims were used to adjust the ma to the required position.

The sprinkling filter nozzles used are a modified of the nozzle developed at the Worcester sewage-trea works. The general details of this nozzle are sho Fig. 6. The patent rights in the nozzle are controll Matthew Gault, Superintendent of Sewers, Wor Mass.

The sewage-treatment works have been const under the supervision of David A. Hartwell, Chief neer, and Harrison P. Eddy, Consulting Engineer. contractors were the R. H. Newell Co. and N. S. The Resident Engineer was Ernest E. Lothrop, to the writer is indebted for suggestions and photogra

Philadelphia Street Cleani by Contract

Philadelphia is one of the few large American where practically all the street-cleaning work is d contract. To get this done efficiently by short-term ments has required much study and many experi on the part of William H. Connell, Chief of the B of Highways; and the results are incorporated specifications for the current year, which contain points worth noting. Abstracts of some of the interesting clauses and those of value to city o facing the same problem follow.

The contractor is not allowed to sublet his co He assumes responsibility for the use of patented ma or processes. He is liable for all damage done employees' acts. He is bound to observe all th and state public health laws. City officials can interested in the contracts.

Use of City Water

Water from the city low-pressure fire hydrants which have been specially marked for street-cleaning work, and generally are not less than one to a block, are used without charge only on permit issued by the Bureau of Water, and only for the purpose of executing the work designated in the specifications, the contractor being liable for any damage done to the hydrants by his employees. Failure to use a standard key in operating the hydrants, the use of leaking hose or hydrant connections, wasting the water, using unmarked hydrants, or other abuse of the privilege may result in the revocation of the permit. The city may revoke the permit when circumstances call for restriction in the use of water.

Annual Inspection

The specifications require that an annual inspection in the form of a parade shall be held during the year at a time designated by the Chief of the Bureau of Highways. The contractor is required to have his entire equipment and employees present, and any equipment or men absent from the inspection, or equipment or men present who do not conform to the requirements of the specifications, are subject to the deductions enumerated in the specifications. On the day of the inspection the men and equipment are relieved of their duties only for the time absolutely necessary, and on the completion of the inspection must continue their work for the full remainder of the day.

Reports by Contractor

The contractor makes daily reports to the Chief of the Bureau on approved forms, which indicate the number of men, machines and vehicles employed, the number of loads of dirt removed, the net weights of each, the number of sewer inlets cleaned each day and such other information as may be requested. The contractor also furnishes, in writing, such information in reference to the conduct of the work under his contract as may be required from time to time by the Chief of the Bureau of Highways. If such information is not supplied within two weeks from date of request for the same, the city may retain such payment as may be due the contractor until he has supplied the information requested.

The contract may be annulled at any time for failure to commence work when specified or to prosecute work to the satisfaction of the city officials. Failure to comply with any part of the specifications is cause for the city, after giving 24-hr. notice to the contractor, to employ sufficient force to have the work properly done and to pay for the same out of the fund deposited by the contractor as security. Payments are made monthly.

Qualifications of Employees

All employees must be thoroughly able-bodied and capable, both physically and mentally, of performing their duties to the satisfaction of the Chief of the Bureau of Highways. Any employee showing evidence of physical or mental incapacity is to be discharged upon the demand of the Chief of the Bureau, and is not to be re-employed except with the written consent of the Chief of the Bureau. All employees must be able to speak English satisfactorily. None but citizens of the United States are employed.

Any employee who neglects his duties, or uses improper language, or is under the influence of liquor while on duty, or accepts or demands pay from citizens for service rendered, or falsifies any report he may be called upon to make, is, upon demand of the Chief of the Bureau of Highways, to be at once discharged.

Each inspector, superintendent or foreman is required to wear while on duty a dark-gray uniform. All other employees must be provided at all times with uniforms approved by the Bureau of Highways. Uniforms are to be kept clean and must not be worn longer than one week without washing. Each employee must also wear at all times a badge on his hat or cap having thereon "D. P. W." in large letters and "Bureau of Highways" in small letters, also the number of the street-cleaning district, preceded by "Dist.," and a serial number. Each employee must also be provided with a suit of oilskin and other necessary articles to protect him while working during inclement weather.

Equipment

All sprinklers, cleaning machines, carts, wagons and other vehicles used in the prosecution of the work under the specifications must be painted in colors designated by the Chief of the Bureau of Highways, and all repainting during the life of the contract must be done in the same colors. All equipment is to be painted at least twice during the year with standard paints, specifications for which are on file in the office of the Bureau of Highways, and must be painted more frequently if these two paintings do not preserve the permanency of the distinguishing colors. The equipment must at all times be maintained in a cleanly condition, and the contractor is required to install adequate cleaning facilities within his stable or yard. Cleaning equipment in streets is not permitted.

Each kind of equipment is defined and described in detail, including squeegees, flushers, machine brooms, sprinklers, hand machine brooms and hand brooms. The contractor is required to keep all his equipment in repair and adjustment, subject to city inspection.

Classification of Street Cleaning

The city is divided into eight districts, and the kind and amount of street cleaning to be done in each are defined. A table is included in the contract giving the areas in each district to be cleaned every day, every two days, every three days and once a week. The day working hours are 7 a.m. to 12 m. and 1 p.m. to 6 p.m., and the night hours, 7:30 p.m. to 6 a.m. The work includes cleaning sidewalks of all waste paper and other refuse and in winter snow removal from the streets.

Liquidated Damages

The amounts of liquidated damages for each kind of neglect, or failure to comply with the specifications, are parts of the contract. There are 38 of these sums specified for various infringements of the contract specifications, and these vary from $25 a day for neglect to make daily reports to 50c. a day for failure of employees to wear badges and the prescribed uniform in a cleanly condition. For instance, failure to provide machine brooms with dust guards entails a loss to the contractor of $1 a day for each machine so operated. For cleaning streets without sprinkling (unless so authorized) $1 per square or part of square so cleaned is charged against the contractor. For not properly loading street dirt into wagons or carts or spilling the dirt 50c. is charged for each offense. These are random illustrations.

Two Large Irrigation Projects in Russia

By Milan Nikolitch*, Assoc. M. Am. Soc. C. E.

SYNOPSIS—Immense areas of dry land are being brought under irrigation by the Russian Government. Of two projects to be described, that on the Golodnaya Steppe, in Turkestan, reclaims for the present some 125,000 acres, while the one on the Mugan Steppe, which borders the Caspian Sea, reclaims 465,000 acres. The Golodnaya Project, here described, is a relatively simple one, consisting of head-gates, 32.6 miles of main canals, 110 miles of distributary and main-drainage canals and 780 miles of laterals and secondary-drainage canals. The Mugan Steppe Project, which will be described in a later issue, is more complex, comprising four independent canal systems.

Within the limits of the Russian Empire, stretching from the 17th to the 191st meridian and from the 35th to the 78th parallel, there is a great variety of climates. Speaking broadly, the average yearly rainfall varies between 16 and 28 in., with the exception of the western provinces of European Russia, where the rainfall rises above, and Caucasia and Turkestan, where it drops below that figure.

The greater part of southwestern European Russia belongs to the zone where agriculture is partly dependent upon irrigation. Turkestan and the eastern part of Transcaucasia are representatives of arid lands in the true sense of the word and require complete irrigation for existence.

It is very probable that in old times a certain portion of now desert lands in Turkestan and Caucasia were irrigated, but there are no means of judging of their magnitude. The most prosperous provinces of Turkestan, like Samarkand, Tashkent and Fergana, have been irrigated from time immemorial and are still supplied with water by primitive native canals. The water-supply for irrigation in Turkestan is mostly derived from small mountain rivers at their emergence upon the plains. Although the small rivers are almost used up, the large ones are scarcely touched.

It is certain that there is more land in Turkestan than can be supplied with water. The six great rivers of Turkestan and Transcaucasia—Illi, Choo, Sir-Daria, Amu-Daria, Arrax and Kura—have a total annual runoff of about 93,000,000 acre-ft., which can all be used for irrigation. Altogether the water-supply of Turkestan is sufficient for many millions of acres.

With the exception of native works, the art of irrigation is quite new in Russia and almost entirely confined to government enterprises. It might be safely said that there is not a single private enterprise of importance. The first large irrigation project in Russia was the irrigation of the Imperial Domains on the Murgab River, described in Engineering News, of Apr. 4, 1912.

The two irrigation projects here described are, so to say, pioneer projects and do in no way represent the standard work of the Russian Reclamation Service. were begun with small means, and could be seriou tended to only in the last two or three years. Th tematic work of the Reclamation Service was begu a few years ago, but it has already developed to grea portions, promising to give excellent results. At th of the Reclamation Service are Prince V. Masalsk S. P. Maximoff, M. Am. Soc. C. E.

What is known as the Golodnaya Steppe occupi country inclosed between the Sir-Daria River, the stan Mountain range and the Kizil Kum Desert. situated between the 40th and 41st parallels and average altitude of 927 ft. above sea level. The area of this country is about 1,900,000 acres, but of it can be irrigated. With the completion of the eastern Golodnaya Steppe irrigation project, abou 700 acres will be reclaimed. Surveys and desig the other portions of the steppe are under way,

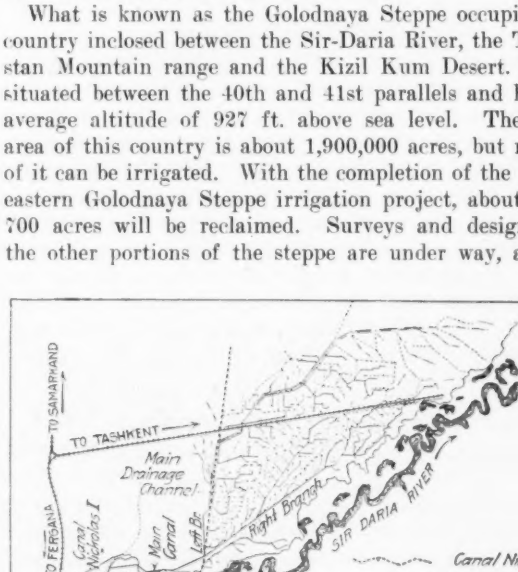


Fig. 1. Map of Golodnaya Steppe Irrigat Project, Russia

the near future a great portion of the former ari will be brought under irrigation. The situation Golodnaya Steppe between the rich provinces of kent, Samarkand and Fergana, with which it is railroad lines, together with rich soil and favora matic conditions, guarantees the success of the prise.

The climate of the Golodnaya Steppe is cont and is characterized by extremes. The summers a and hot; the winters are sometimes very cold. Th perature reaches as high as 108° F. in the shade low as —20° F. The maximum mean monthly ature for a period of seven years was 83° F., wh minimum was 19.2° F. Low temperatures last short time. The summer heat, on the contrary, over a long period of the year. An average fo years shows that the number of days without the Golodnaya Steppe is 209.

The precipitation is comparatively small, a greatest portion of it occurs in the winter. The rainfall for five years was 12.3 in., but for a long iod of observation it would probably be less.

*Chief Engineer, Northern Semiretchensk Irrigation Project, Verny, Turkestan, Russia.

amount only 0.55 in. fell during June, July, August and September.

The low rainfall, the great dryness of the air and the fact that the dry period of the year coincides with high temperatures make irrigation a necessity. For only a short time during the early spring the steppe is covered with luxuriant vegetation, but in May the sun and the lack of moisture turn it into a desert-like area, fully justifying its name, the Steppe of Hunger.

The water-supply for the Golodnaya Steppe is diverted from the Sir-Daria River, the only stream which can insure a supply to a large area. Sir-Daria rises in the mountains of the Central Tian-shan, where its two branches are known as Narin and Kara-Daria. Both are torrential in character in their upper courses. After leaving the mountains, each river runs through the province of Fergana, where a great portion of the Kara-Daria is used for irrigation by the native works. The Sir-Daria, made up by the junction of the Narin and the Kara-Daria, flows for some distance through Fergana, and after passing the mountain Mogol Tau, enters the great central Asiatic plain, through which it runs for about 810 miles to the Aral Sea. The total length of the river is about 1430 miles.

The Sir-Daria owes its waters to the melting of snow in the high mountains. Its high-water period occurs in summer, when mostly needed for irrigation.

The discharge of the river has been regularly observed since 1903. In the following table are given mean annual discharges of the Sir-Daria for a period of eight years, according to the reports of the Turkestan hydrometric service:

ANNUAL DISCHARGES OF SIR-DARIA RIVER FROM 1903 TO 1910

(Gaged at the head of the main canal)

Year	Discharge, Sec.-Ft.	Year	Discharge, Sec.-Ft.
1903	27,000	1907	22,400
1904	22,400	1908	33,500
1905	22,500	1909	22,400
1906	17,100	1910	23,000

The maximum discharge occurs in May and June and the minimum in January. During the period 1903-1910 a maximum of 109,000 sec.-ft. has been observed, while during the same time the minimum was 6860 sec.-ft.

HISTORY—The art of irrigation has been practiced in Turkestan from very early times. Large areas that are now abandoned and desert-like have been reclaimed in the past. Still, the Golodnaya Steppe does not seem to have been irrigated to a large extent, although, judging by existing legends, attempts to that end were not lacking. The fact that the river lies some 50 ft. below the floor of the Golodnaya Steppe made it difficult for native engineers to bring the water to the steppe, and all attempts resulted in a few small canals, their remains still being traced in the steppe. Only the lowland along the river and the area near the mouth of cañons of the small mountain rivers were irrigated to some extent.

With the Russian occupation of the country the idea of reclaiming the Golodnaya Steppe by the water of the Sir-Daria was renewed. During the last 40 years several attempts have been made, but owing to various unfortunate circumstances, most of them proved failures. Only the Canal Emperor Nicholas I was successfully completed. It irrigates an area of about 32,400 acres.

The first steps toward irrigating large areas of the Golodnaya Steppe by the government date back to 1895, when the first well-organized parties were sent there. The actual work of construction of the Northeastern Golodnaya Steppe project began in 1901, and was prosecuted slowly on account of lack of funds until 1911, when the first large appropriation was made and the work vigorously resumed. By the end of 1913 most of the work was completed. The area thus brought under cultivation is 121,500 acres, not counting 32,400 acres, dominated by the Canal Nicholas I, which is to be incorporated into this system.

GENERAL FEATURES OF THE PROJECT—Generally speaking, the project (see map, Fig. 1) comprises head-

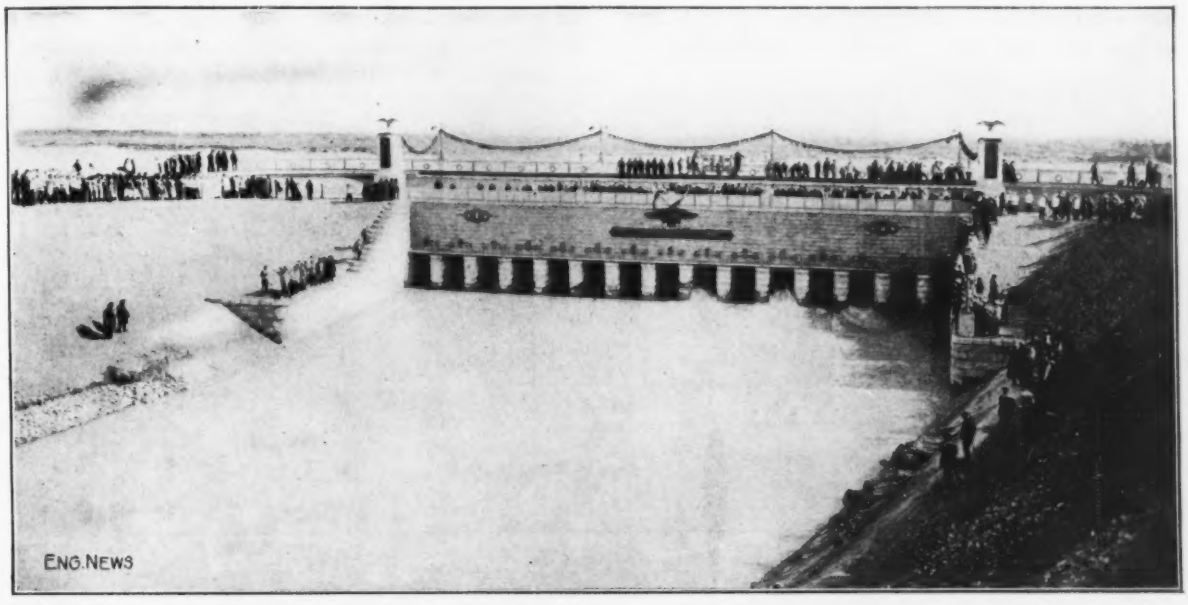


FIG. 2. VIEW OF HEAD-GATES OF GOLODNAYA IRRIGATION PROJECT

(The structure was officially opened on Oct. 5, 1913, in the presence of many state officials)

gates, a main canal 23.6 miles long, distributaries and main drainage canals 110 miles long, laterals and secondary drainage channels about 870 miles long, regulators, outlets, bridges, etc.—altogether 540 structures.

During the construction about 17,500,000 cu.yd.of earth had to be moved, of which 46% was from the main canal. The total area covered by the canal is about 218,700 acres, but only some 125,000 acres is supposed to be actually irrigated at one time. The cost of the works is estimated to be $3,660,000, or a unit cost of $29.28 per acre of irrigated land.

HEAD-WORKS—No dam is provided, and in order to assure the full supply to the canal during the lowest water stand in the river, even when other irrigation projects along the upper course of the Sir-Daria are realized, the sill of the intake gates is placed at about the bottom elevation of the river. This has resulted in a maximum head against the gates of about 21.7 ft.

The head-gates (Fig. 2) are similar to those used on irrigation canals in India. They consist of 15 openings, 6.3x10.50 ft., separated by masonry piers 28.70 ft. high and 3.50 ft. thick. The piers rest upon a heavy concrete foundation 8.75 ft. thick, which is faced by granite blocks 1.05 to 1.75 ft. thick. The entrance to the canal is regulated by steel gates raised by a traveling winch from the working platform. A row of stop logs, placed in the front of the gates, is provided to prevent the débris, carried on the bottom of the river, from entering the canal, and to help in obtaining relatively clear water from the surface. To reduce the effect of the falling water upon the floor, provision is made for another row of stop logs in the rear part of the piers, by means of which a kind of water cushion is created. For a distance of 2450 ft. below the head-gates the bottom and the slopes of the canal are protected by rubble masonry, concrete and riprap. The cost of the structure was $288,000.

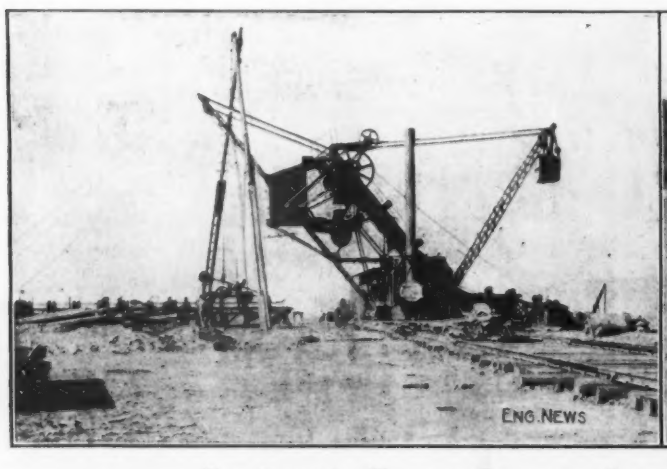
THE MAIN CANAL—The floor of the Golodnaya Steppe below the head-gates is about 56 ft. higher than the alluvial lowland along the river. The length of the main canal from the head-gates to the point where it emerges upon the steppe and is divided into two main distributaries is about 23 miles.

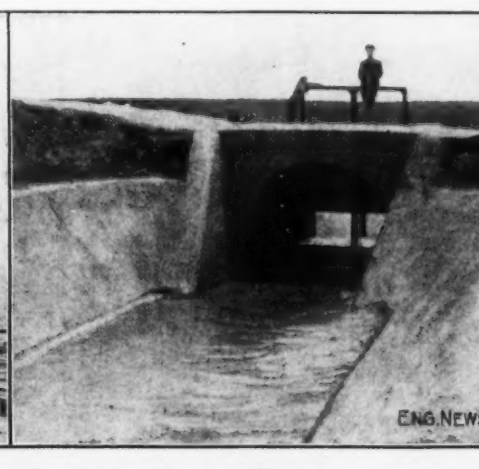
The first part of the canal is made in conglomerate and gravel, after which the canal runs through the lowland area, mostly in cut, also in combined cut-and-fill sec Toward the end the canal extends through several cuts, of which the deepest is about 53 ft.

The dimensions of the main canal have been desi according to the material in which the canal is loc The bottom width varies from 56.70 to 98 ft. The d ranges from 5.25 to 9.45 ft. The adopted grad rather higher than is commonly used for canals of size, varying from 0.0001 to 0.0007. The dischar capacity of the canal is said to be not less than 1715 ft. Where the canal is made in cut it is given side s of 1½ : 1 and in deep cuts above the water surface 1 Embankments are made with side slopes of 2 : 1 and a top width of 21 ft.

The total earthwork, in amount of 8,130,000 cu cost $1,215,000. About 266,000 cu.yd. of excavatio gravel and conglomerate at the head of the canal been done with a steam shovel. For the remaining hand labor has been used exclusively.

THE DISTRIBUTARY SYSTEM—At the 23d mile main canal is divided into two branches, which are tically two main canals. The Right Branch was





FIGS. 3 AND 4. VIEWS ON GOLODNAYA STEPPE IRRIGATION PROJECT, RUSSIA
(Fig. 3 (left)—The Lübeck excavator. Fig. 4 (right)—A regulator at the head of a distributing canal)

pleted early last year (May 16, 1914), while the branch is only partly completed with a view t ture extensions. The topography of the country al of so locating the canals as to enable them to supp water to laterals on either side.

The Right Branch is designed to have a capac 600 sec.-ft.; the Left Branch, of 1294 sec.-ft. The Branch has a length of 29.3 miles, besides two mai erals, while the Left Branch is 33.3 miles long. cross-section of both branches is so designed tha water is mostly above the surface of the surrou country. Of 3,660,000 cu.yd. moved from the cross-section and borrow-pits, about 2,950,000 cu.yd used in embankments. The top width of the em ments is from 10.50 to 17.50 ft. and the side slop 2 : 1. The grades vary from 0.0001 to 0.0005.

The water surface in the canal being well abo ground surface, special care was exercised to obtain embankments by thorough wetting and tampin special feature of building embankments on several sections was to provide, by means of low embank basins of the required width and to dump eart

them and allow it to settle under water, after which the water was drained off. The embankments obtained in this way are said to be more satisfactory than those made by common methods of wetting and tamping.

So far the lateral system is built to deliver water to units of 370 acres, but as the land is to be sold in units of 8 to 10 dessetins, or about 21.60 to 27 acres, it is very probable that the government is going to construct the lateral system to suit this subdivision, leaving only the farmers' ditches to private initiative.

The lateral outlets are of concrete or reinforced concrete, controlled by steel gates. With the completion of the system there will be about 292 miles of laterals and 510 outlets.

During the construction of the distributary system both hand and machine work were used. Three excavators of the type shown by the view, Fig. 3, were installed, and gave fairly good results.

Drainage System—The small slope of the country, the proximity of ground water, the presence of alkali and the possibility of increasing it with the use of irrigation, but especially the aim to improve the alkali soil by thorough drainage, have imposed the necessity of designing and building a complete drainage system at the same time as the irrigation system.

The main drainage channel is excavated in the valley between the Right and Left Branches. It is 35.8 miles long and has a discharge of 515 sec.-ft. With a small exception the entire irrigated area drains into it. The total length of drainage canals and ditches amounts to about 537 miles. The object of the drainage system is not only to take care of the surplus water in the soil, but also of one part of the surface water, which is going to be wasted through the main collector into the river.

Structures—With the exception of the head-gates, there are no structures of special interest. (See Fig. 2 for head-gates and Fig. 4 for a minor head-gate or regulator at the head of a small canal.) For building material, concrete and reinforced concrete were used for permanent bridges, regulators and outlets. Concrete and rubble masonry were used in substructures of steel bridges under railroad tracks; common and adobe brick for buildings, and wood for temporary bridges.

Future Extensions—By the project just completed, only the northeastern part of the Golodnaya Steppe is irrigated; but simultaneously with the construction other large areas of the steppe have been surveyed, and at the time of writing the designs are being prepared. In the near future there will be about 1,323,000 acres of irrigated land in this part of Turkestan. Of the total acreage it is estimated that 594,000 acres are in the northern part of Golodnaya Steppe; 648,000 acres in its southern part, and about 81,000 acres are situated on the right bank of the Sir-Daria, which is also called the Dalverzin Steppe.

For this great undertaking some change must be made in the adopted type of the head-works, which are not designed to meet the requirements of a large project. Very probably a dam will be built across the river at or above the present head-gates. By means of the dam, water can be taken direct to the floor of the Golodnaya Steppe. The drop thus created in the canal can be utilized for generating power, which again can be used for pumping.

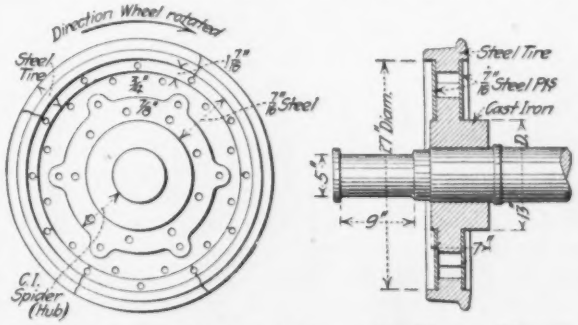
The construction of the project has been made under the chief engineer, F. Tolmacheff, and the assistant chief engineer, A. Kursish, to whom the author is indebted for many data. The contractor was S. N. Chaeff.

[*The Mugan Steppe Project will be described later.*]

Built-Up Car Wheels Declared Inadequate

Steel-railway-car wheels built up with a cast hub, rolled tire and thin cheek plates have been declared of insufficient strength for present requirements. This statement is made by H. W. Belknap, Chief of the Division of Safety, and J. E. Howard, Engineer-Physicist, Interstate Commerce Commission, as the result of investigations following the derailment of a passenger train, caused by a broken wheel, on the Chicago, Milwaukee & St. Paul Ry., at Oakwood, Wis., on Jan. 30, 1915.

After this accident the tire of the wheel causing the trouble was found broken in four pieces, three of which were recovered in 850 ft. back along the track. The remaining piece has not been found. The construction of



Elevation and Section of Built-Up Wheel Which Failed at Oakwood, Wis.

the broken wheel was as shown in the accompanying sketch. Besides the four radial fractures, which all passed through bolt holes, the tire web was cracked from each bolt hole to the inner circumference. The broken pieces of tire assumed a radius of curvature slightly less than when intact, indicating internal stresses. Lack of rigidity and of unity of action in the built-up wheel were shown by brightened plate metal around the outer bolt holes and by shoulders where the inner edge of the tire web bore. The mate to the broken wheel (on the same axle) was found to have incipient cracks at each bolt hole of the tire, though otherwise intact. The total travel of the broken wheel was 276,400 mi., corresponding to 170 million revolutions. The loads ranged from 9375 to 11,250 lb.

Twenty similar wheels which had been removed (for cause) from service were examined, and half were found defective, 56 incipient cracks being seen in the interior of the webs and 19 full fractures. All the tires examined showed internal stress, due to cold rolling in service. One tire through which a radial cut, 2 in. wide, was made sprung together $1\frac{1}{16}$ in.

The presence of incipient fractures cannot be detected by hammer test or external inspection—only by partial dismantling of a wheel. The critical places in the construction are hidden by plates and bolts. While wheels of this type are reported as not being used as much as formerly, the investigators recommend inspection of the metal at bolt holes as a safety measure.

The Federal Railway-Valuation Work*

By George H. Burgess†

In the Federal valuation work now under way the Interstate Commerce Commission and the railways of this country are engaged upon an undertaking of great magnitude, and one for which there have been no well-established precedents in this or any other country.

The first state valuation of railways was made in Texas in 1894 for the regulation of security issues. This work was taken up in Michigan in 1900 and in Wisconsin in 1903 for taxation purposes, and in Minnesota in 1907 in connection with revision of rates. Valuations have also been made in Washington, New Jersey, South Dakota, Nebraska, Kansas, Oklahoma and California for various purposes.

The trend toward a Federal valuation of all railroad properties in the United States began with recommendations in the early reports of the Interstate Commerce Commission that such work be undertaken. In 1900 the Interstate Commerce Commission made an investigation of the value of all railroad properties as indicated by market prices of securities, and expanded this work in coöperation with the Census Office in 1904. President Roosevelt in March, 1906, wrote to the Interstate Commerce Commission stating that it seemed to him to be desirable to have a valuation made, and in December, 1906, and again in December, 1907, Senator La Follette introduced bills providing for such a valuation. The final bill which has resulted in this work being undertaken was approved by the President Mar. 1, 1913. There is nothing in the act which specifies the purpose for which this valuation is to be made. The results may be used for any of the following purposes: Taxation, rate-making, control of security issues and state ownership.

The provisions of the act require the ascertainment of the original cost to date, the cost of reproduction new, the amount of depreciation, and other values and elements of value. It also provides for investigation into the financial and corporate histories of the properties and a study of the amount and nature of public aid given in connection with the construction of railroads. The act provides that after the commission has made its investigation and has arrived at a determination of the value of any property, public notice of the same shall be given, and the carrier is allowed 30 days to either accept or appeal from the findings of the commission. It is this provision that makes it so necessary for the carriers to have their own organizations to follow closely the work of the commission's employees, so as to be prepared when the valuation is announced to either accept or reject it.

The Government organization for this work consists of a director of valuation assisted by an advisory board and an attorney, an engineering board, an accounting board, and a land board, as well as a number of men for special purposes; as, for instance, a cost-data bureau has recently been established to make a study as to unit prices to be applied to construction quantities. Charles A. Prouty, who was a member of the Interstate Commerce Commission at the time of the passage of the Valu Act, is director of valuation. The country has divided into five districts, each containing about 5 mi. of railroad. These districts are known as the Ea Southern, Central, Western, and Pacific. The engi ing board consists of five members, each member h charge of one of the districts.

Each member of the engineering board is assisted district engineer, who is in charge of all the field or zations for his district.

All the members of the engineering board an district engineers have had considerable experien railroad work. Of these ten men, nine are membe the American Society of Civil Engineers. The orga tion for each district consists of a number of engi having varied duties. There is an assistant di engineer, civil, structural, signal, mechanical, elec bridge, roadway and track, field, and office engi architects, inspectors of motive power and car equip and numerous engineers filling positions in the parties.

Parties have been sent out on several railroads in district to make the actual field surveys and fie ventory. A field party generally consists of ten divided into squads or groups, some of which do sectioning, others chaining, and others miscellaneou and computation work. All of the engineers emp in this work, with the exception of the members engineering board and the district engineers, have selected through the Civil Service Commission at ington. Many of the higher rated engineers have selected by the Civil Service Commission, not by of examination but through selection based on stud man's record as submitted by himself and as giv references to whom he may have referred the comm in connection with his application. For the positions, regular written examinations have been mitted, and the result of such examination, togethe a man's record as to education and experience and mendations by his references, has established a for selection.

So far as the work has been undertaken by the G ment in the field, it has been to make a very caref minute survey of all physical property. This in cross-sectioning of the entire road and careful comp of quantities of cuts and fills and the classificat materials. All bridges and buildings are measure tracks and various units that go to make up the such as weight of rail, number of ties, frogs and sw spikes, fastenings of all kinds, and depth and cha of ballast, are noted, and proper allowance is m compilation of quantities in connection with each No attempt has thus been made to establish u prices to apply to the units found by the field This is probably a question that will require caref sideration and conference between the Gover engineers and the carriers. The Government before stated, established a bureau, the sole duty of is to investigate unit costs, and this work is in the of men who are undoubtedly well suited to hand question.

Survey parties were placed in the field by the G ment in 1914, and work has been in progress on 16 different lines. Field work has been practicall pleted on six railways, about 3800 mi. of line.

*From a paper presented before the Binghamton Engineering Society.

†Chairman of Valuation Committee, Delaware & Hudson Co., Albany, N. Y.

The Binder Course in Asphalt Pavements

By Robert Klotz*

Present-day practice in sheet-asphalt and asphaltic or bituminous pavement construction for city streets and discussions of defects in such pavements show evidence of a constantly increasing tendency to overlook the purpose and importance of what is known as the "binder course," even to the extent of entirely eliminating this course or any substitute for it.

The various schemes and devices brought forward from time to time for the purpose of eliminating the wave effect met with in pavements of this character lead to the conclusion that a gentle reminder of the nature of and reason for the binder course might be of value to those interested in the question of economical pavement maintenance.

The purpose of the binder course is, as its name implies, to bind the top layer or wearing surface of the pavement to the base, whether the latter be of concrete, granite block, macadam or other material. The mixture used for the wearing surface is designed to form, under compression, a reasonably hard, durable and impervious covering, and being therefore comparatively low in bitumen has little if any power of adhesion.

The binder course originally used consisted of graded gravel thoroughly coated with coal tar, or coal-tar pitch, and laid at a temperature sufficiently high to provide for good adhesion to the base and to the surface layer.

The coal tar or pitch was later replaced by asphalt or asphaltic cement, presumably because of the increased difficulty of obtaining tar economically, due to the development of the water-gas process for the manufacture of illuminating gas and the consequent reduction in the quantity of commercial coal tar produced, and because of the decreased cost of the asphalt and its availability as part of the stock of the mixing plant. While the adhesive power of the binder thus produced was apparently lower than that of the tar-binder, it was still sufficient to provide the binding action required to prevent the forming of waves in the surface.

Within the last three or four years the various asphalt companies have introduced, apparently with a view to economy, what is commonly referred to as a close-mixture binder, which consists of broken stone screenings, varying from about a 1-in. size downward, covered with hot liquid asphalt. Owing probably to the reduced first cost of the pavement thus obtained, the use of this type of binder has been permitted under certain specifications, and quite a considerable area of this pavement has been laid.

The writer's experience with this type of binder, particularly on repair work, has shown that the old-style, or stone, binder is far more preferable and the one to be relied on to prevent the formation of waves in the pavement surface.

Owing to the decreased viscosity of the asphalt necessary to provide for the proper mixing of close-mixture binder, the coating on the particles of stone is comparatively thin. This makes the mixture subject to cooling below the critical temperature, within the time required for delivery and laying. The weight of the roller is more evenly distributed over the surface of contact between the binder and the base, and the pressure on the individual particles of stone is insufficient to bring the hotter portion of the more or less hardened coating into intimate contact with the base.

With new pavement the unfavorable behavior of the "close mixture" is less evident than when an old pavement is repaired, due, no doubt, to the greater care and the more exacting supervision.

The action of an asphalt pavement where no binder course is used was brought very clearly to the writer's attention during 1912, when he was in charge of certain pavement repairs in the city of New York, all of the work being subject to the city's specifications and inspection.

During the early part of that year an order was issued to the effect that when repairs were required on asphalt pavements where the thickness of the original pavement, consisting of 1 in. of binder and a 2 in. top course, had been reduced to 1½ in. or less (that being the newly specified thickness of the top course), the binder course was to be omitted.

The writer managed to avoid almost entirely the forming of waves in the pavement, which he felt certain would be the result of literal adherence to this order, by having the base spattered or painted with a coating of hot liquid asphalt immediately before laying the top-course mixture, this asphalt acting as a very efficient "glue." Repairs made under the direct supervision of the city authorities on the same streets and subject to the same traffic, without the thin but effective layer of adhesive, showed waves within from two to three days after laying, and were destroyed by the action of traffic within two or three weeks.

While various theories have been advanced from time to time to account for the waves formed in asphalt pavements, some of them apparently based upon sound reasoning, practical experience seems to show that whatever may be the particular action of traffic which causes them, waves can be avoided by providing a proper bond between the pavement proper and the base, and that three-wheel rollers, etc., are unnecessary and inadvisable complications to attempt to insert into the science of constructing and maintaining bituminous pavements.

An example of the need of special care in the construction of the binder course is shown in some work carried out by the writer in New York City in 1910, the area involving about 250 sq.yd. of sheet-asphalt pavement located in and around two underground-conduit car tracks with a double branch-off and curves, both being crossed constantly in the same direction by exceedingly heavy traffic. Frequent repairs had been required at this point owing to the rolling effect of traffic, the asphalt being continually forced against the rails and ground off as it reached the level of the head.

The relaying of the entire area was required upon the reconstruction of the tracks, and the work was carried out during the night and the early morning to permit laying of the pavement without seriously hindering traffic. Under the circumstances, the supervision of the city authorities was not as definite and exacting as might have been the case had the work been done during regular hours; and as the sub-base was known to be of a sufficiently dry and porous nature to permit of the proper setting of the base, the asphalt was laid on the "green" concrete, which had been in place from 3 to 12 hr.

*111 West 49th St., New York City.

This pavement remained in place for over 2½ years under the same traffic conditions as previously, the only repair required being one small patch where the asphalt had been disturbed by a loose rail joint.

Sad to relate, this area was almost entirely removed in connection with subway construction at the end of the time mentioned. A more extended record of its beha would probably have been of considerable value, altho the writer feels that the performance up to the tim removal was sufficiently marked to warrant more sideration of a proper joining of the pavement and base than seems to be the practice at present.

Constructing the Fitchburg Sewage-Works

By Frank A. Marston*

SYNOPSIS—Features of the work were the 2½-in. cement-plaster and metal-lath walls of the Imhoff tanks and sprinkling filters, and the drainage system of the sprinkling filters. The sprinkling nozzles are also described.

Operation of the sewage-treatment works for the city of Fitchburg, Mass., was officially started on Oct. 8, 1914, and put into full swing a week later. The design of these works, consisting of Imhoff settling tanks, sludge beds 10 ft. deep, sprinkling filters and secondary settling tanks, was described in Engineering News, June 5, 1913, page 1176. As a number of the details are unusual, it may be of interest to consider them in view of the knowledge gained during construction.

The thin partition walls in the Imhoff tanks were constructed of 1½- to 2-in. cement plaster on rib-metal reinforcing lath of the type known as rib-trus, manufactured by the Berger Manufacturing Co., Canton, Ohio. The sheets of steel were supported every 10 ft. by structural-steel frames, and temporary wooden supports were also provided to reduce the unsupported span to 5 ft. during construction. Even with these additional supports considerable difficulty was experienced in keeping the partitions in proper alignment. The cement mortar, composed of 1 part cement and 2 parts granite dust, was applied by means of the cement-gun. This method, although producing a dense, hard wall, increased the difficulty in screeding and troweling the surface to requisite smoothness. The upper edge was made square by shooting the mortar against a piece of lagging laid along the top of the steel sheets. The chief difficulty in manipulating the cem gun was to secure a uniform thickness of wall and form width of slots at the bottom of the V-shaped trou The cement mortar, as shot from the nozzle, accumul rapidly on the steel, both on the ribs and flat surface

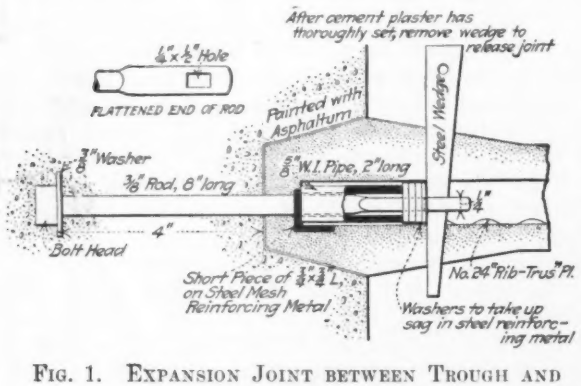

After cement plaster has thoroughly set, remove wedge to release joint
¼"x½" Hole
FLATTENED END OF ROD
Painted with Asphaltum
Steel Wedge
⅜" Washer
⅜" Rod, 6" long
⅝" W.I. Pipe, 2" long
¼"
4"
Bolt Head
Short Piece of ¾"x¾" L. on Steel Mesh Reinforcing Metal
No. 24 "Rib-Trus" Pl.
Washers to take up sag in steel reinforcing metal

Fig. 1. Expansion Joint between Trough and Walls of Imhoff Tank

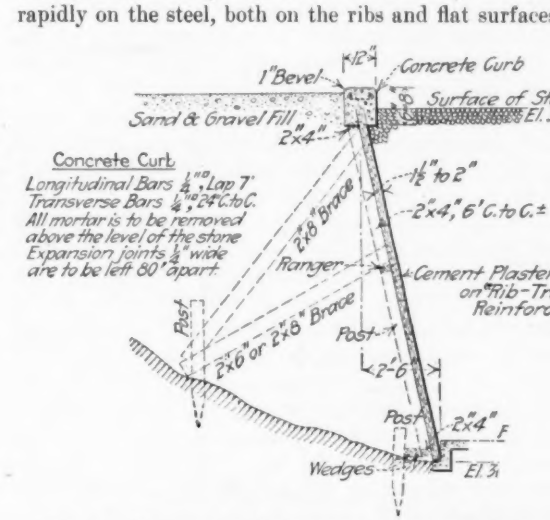


Fig. 2. Details of Retaining Wall for Sprinkling Filter

that it was difficult to obtain a wall having a plane face. This latter effect was produced by screeding troweling. It is a question whether hand-plastered would have been as cheap or as durable; on the hand, it would have been possible to obtain a better ished surface. The lower edges could probably have handled more easily if a light steel angle had fastened to the edge of the steel sheets as a stiff

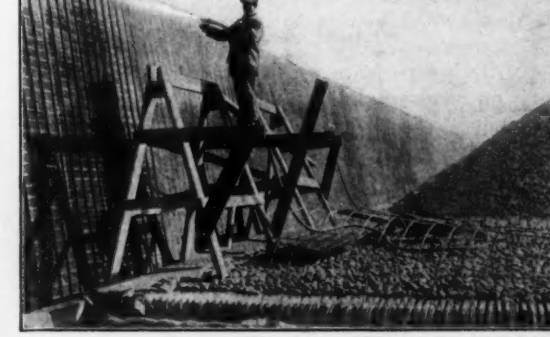


Fig. 3. Applying Cement Plaster to Wall Sprinkling Filter

*Assistant Engineer with Metcalf & Eddy, Consulting Engineers, 14 Beacon St., Boston, Mass.

Cost of the Work

When it was first suggested that a valuation should be undertaken of all the railroads in the United States, Professor Adams, statistician of the Interstate Commerce Commission, stated his belief that the work could be done at about the same cost as the work that was completed in Michigan at about that time, about $5 per mile or $1,250,000 for the whole country, and that the cost to the railroads would probably be as much more. The costs of all state appraisals had been not to exceed $10 per mile, and in Texas as low as $2 per mile, indicating a very incomplete method of doing the work. In 1912 Interstate Commerce Commissioner Clements stated that the cost would probably approximate $3,000,000 and the length of time to do the work would be three years, although he afterward stated that the cost might run up to $5,000,000 and the time to five years. Interstate Commerce Commissioner Meyer at about the same time stated that the cost would probably be as high as $5,000,000 for the Government and that it would cost the railroads as much more and take four years to complete the work. Railroad officials who appeared before the Senate committee at hearings on the bill which was finally passed also greatly underestimated the cost, as they stated that the work would cost the railroad companies and the Government each about $3,000,000.

In August, 1913, after the passage of the act and when the plans were fairly well formulated as to the method of handling the work, the Interstate Commerce Commission estimated that the Government expenditure would be from $10,000,000 to $15,000,000 and that the work would take about seven years to complete. A year and a half after the passage of the act Director Prouty in his speech before the National Association of Railway Commissioners on Nov. 17, 1914, stated that the expense to the Government would be about $16,000,000 for obtaining cost of reproduction and for the accounting work and that it was likely the cost to the railroads would be from $25,000,000 to $35,000,000, which would mean a total cost of nearly $50,000,000—quite a different estimate from that made at the time of the passage of the act. As to the length of time that it will take to do this work, two years have elapsed since the passage of the act, and up to about the first of January field work has been completed on about 11,000 mi. Allowing a year to get the work under way, it is safe to state that 11,000 mi. has been completed in one year. Directer Prouty has stated that sufficient parties should be in the field by July 1, 1915, to complete 4000 mi. per month, or 48,000 per year, which would mean that from July 1, 1915, it will take practically five years to complete the work. This estimate is based on past results, generally on smaller roads, and it is probable that work cannot proceed so rapidly on the larger systems, so that it seems probable that this time limit may be exceeded.

Valuation Organization by the Railways

On the passage of the Valuation Act it became necessary for the railroad companies to establish an organization which would enable them to keep in touch with the progress of the work and provide the required coöperation with the Government. Practically all the railroad companies in the country joined in the formation of what is known as the President's Conference Committee. This committee consists of 18 railroad presidents under the general chairmanship of Samual Rea, president of the Pennsylvania Railroad. This conference committee is divided into three groups—Eastern, Western and Southern—with a chairman for each group.

At the group headquarters there is an engineer reporting to the chairman. There are a number of attorneys attached to the various groups, whose duty it is to consider the legal aspects of the problems confronting them in connection with the work. There have also been formed an engineering committee of 13, an equipment committee of 5, a land committee of 15, and a financial, history, and accounting committee of 13. These committees report to the Presidents' Conference Committee and take under consideration the various questions for which decision is desired by the carriers as to methods of procedure and uniformity of action; and at the same time these committees meet with the various Government boards of similar character to discuss questions which may arise.

Practically all the railroad companies have organized valuation committees, made up of officials of the company, generally composed of representatives of the engineering, motive-power, land, accounting, and legal departments, and in addition a special organization has been formed to carry on the actual preparation of necessary information. The Delaware & Hudson Co. established an organization about Nov. 1, 1913. In addition to the preparation of required maps and profiles, we have made a careful study of the construction history of the road to obtain dates as to the building of the various parts of the system.

One of the most important features of our present work is the study of our records for hidden or obscure items of cost. It is obvious that a field inspection of a property, even with careful measurements taken of all visible features of construction, will not be the true measure of quantities comprised in the property nor give us the true cost or value. For instance, fills have been made on soft ground requiring many yards of earth which cannot be measured, difficult and expensive foundations have been placed under structures which do not show up now, streams and highways have been changed, and innumerable difficulties have been encountered involving heavy expenditures which cannot be determined on the ground.

Our search of the records discloses many of these items in such a way as to be readily verified, also the recollection of older employees and residents along the line gives us information of importance. All these data are collected in such form as to be properly presented to the Government engineers, and will no doubt be accepted.

It is necessary for the carriers to have representatives with the Government parties, who are called pilots, who are supposed to be thoroughly familiar with the property. These pilots will be intrusted with the duty of seeing to it that all visible property of the railroad is measured or noted. Also they must call attention to the hidden and obscure quantities where known to exist, and generally assist the Government party in making an accurate survey of the entire property. The careful training of the pilots is essential, and the men who are now working up the preliminary information will later be used by the carriers as their pilots.

The Delaware & Hudson Co.'s lines are made up of 11 different active corporations, while the total number of

corporations that have been organized during the history of the company is 47.

The first railroad track built on the Delaware & Hudson was completed and put in operation in 1829 between Carbondale and Honesdale. This consisted of hemlock stringers with iron strap rail to reduce wear. The motive power was gravity and horses. The first locomotive engine that ever ran on rails in this country was the "Stourbridge Lion," which ran a trial trip over a part of this track on Aug. 8, 1829. While the success of this means of locomotion was assured by this experimental trip, the locomotive was not used in regular traffic, it being found that the track and trestles supporting it over streams were not of sufficient strength to carry it.

The first line which now makes up the Delaware & Hudson system on which steam power was used regularly is that between Saratoga and Schenectady, whi built in 1832 from Schenectady to Ballsto completed in 1833 to Saratoga. In 1835 the lin Troy to Ballston was built and in 1850 was co through to Whitehall. The line along Lake Cha to the Canada line was built in the '70's and co in 1876. The line between Albany and Bingham completed in 1869, having been under construct about ten years. About 87% of the Delaware & system was built prior to 1880, so that it become difficult to get satisfactory records of construction on more than 30 years ago.

It is of the utmost importance that all quantities be carefully measured and every possible allowan to the railroad companies for the full amount of property.

New Chittenden Plant of the Pittsford Power Co.

By Thomas Fraher*

SYNOPSIS—The highest-head plant in the East develops 3700 hp. from water flowing between two reservoirs and previously unutilized. A notable feature is a 2¼-mile length of Oregon fir pipe. Some interesting notes on construction methods for a small plant are appended.

The recently completed hydro-electric development of the Pittsford Power Co. in Chittenden, Vt., 7 mi. north of Rutland, is of unusual interest, since it has the highest head in the East and a long wood-stave penstock built mostly of Oregon fir. A short run of pipe made from local spruce allows comparison of two materials and shows the advantages of the Western lumber.

The plant utilizes storage water from an existing reservoir, the flow from which to a lower reservoir formerly performed no useful work. This reservoir impounded about 800,000,000 cu.ft., which the additional runoff increased to about 1,000,000,000 cu.ft. of water available in an average year. The static head from the top of the flashboards to the weir in the tailrace is 481 ft. Two 1850-hp. units are installed at present, and provision has been made for a third similar unit.

Features of Design

Wood-Stave Pipe—Fig. 2 shows the alignment of the pipe line. Starting at the dam, it is of native spruce for a distance of about 1400 ft., and then of Oregon fir for 12,000 ft. farther, except at a point around a rocky knoll, where the curvature was too short for wood-stave pipe and it was found necessary to insert a steel bend. The gradient to the end of the wood-stave pipe is uniform at 0.3%, but from here the line drops abruptly to the power house through a steel penstock about 2800 ft. long. The spruce staves were made from lumber cut in the adjacent territory and air-dried for nine months. They were then milled to a finished thickness of 2⅝ in. and averaged from 12 to 14 ft. long. The Oregon-fir staves were made from live Douglas fir and were milled to a finished thickness of 2⅛ in., the average lengths running abou Thirty-six fir staves made a pipe section of 60 in diameter. The pipe details may be summarized as

Inside and outside of staves milled to true pipe ci ence; edges beveled radially; ends butted square a ⅛ x 1⅛-in. saw cut for steel tongues; bands of op steel, ⅝-in. diameter, one with both ends headed with rolled threads on each end, bent to pipe circu and dipped in asphaltum paint before shipping; "n tric" malleable-iron dipped shoes; band spacing var 3 to 6½ in.; maximum head, 85 ft.

Connection was made between the existing 48- let valve of the reservoir and the 60-in. wooden through a steel increaser with an 18-in. branc which was placed a 24-in. steel vent pipe 55 ft. hi tected by a double casing of wood staves and ele heated by a car heater.

Aqueducts—Fig. 2 shows four stream crossings were made on steel I-beams supported by 2x8-ft. piers and rubble-stone abutments. The spans ar in detail in Fig. 4. The distance of the cradles a top of the flange varied according to their pos that when the pipe was full the deflection of th would bring the staves to a straight line. Both and staves on the trestles were creosoted.

Steel Penstock—At the end of the wood-pipe a steel nipple, to which is bolted a butterfly valve, in turn is bolted a tapered section, reducing the s 60 to 54 in. The steel penstock then makes a c horizontal and vertical curve and runs to the pow through various gradients from 2 to 65%. The s data may be thus summarized:

Length of 54-in. lock-bar pipe, 600 ft.; length riveted pipe, 1100 ft.; length of 52-in. riveted pipe, thickness varies from ⅜ to ⅝ in. All circumferent single riveted; longitudinal seams triple riveted wi butt straps.

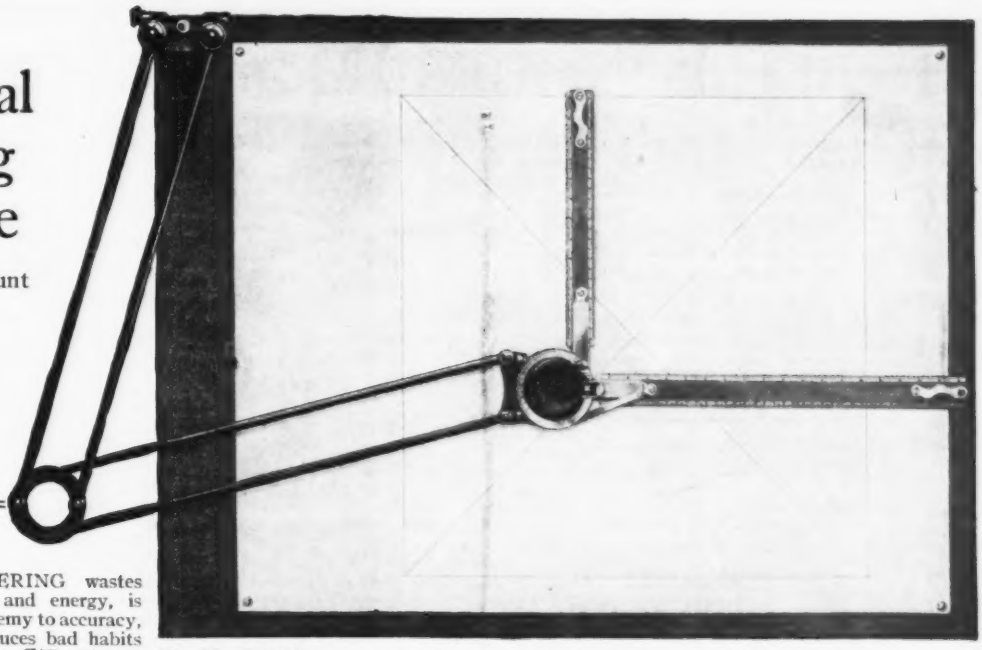
The steel penstock is anchored at the angles a is a heavy reinforced-concrete anchor at the pow

Surge Tank—Just below the butterfly valve steel-pipe connection is taken off to a surge tan in diameter by 90 ft. high. The top of this is 19 the flashboards on the dam. After the tank was frost casing, 18 ft. in diameter, made of old 2-

*219 West 140th St., New York City; formerly Superintendent of Construction for W. S. Barstow & Co., at Chittenden, Vt.

The Universal Drafting Machine

Saves a Vast Amount of Puttering



PUTTERING wastes time and energy, is an enemy to accuracy, and produces bad habits of thought. ¶ The Universal Drafting Machine saves so much puttering that it makes a 25 to 50% difference in the time required to make a drawing. ¶ The mental effect of working with quickness and dispatch is important, as it induces habits of direct thought and concentration. ¶ Such waste as is involved in making drawings without the Universal Drafting Machine would not be tolerated in a modern shop or general office, and ought not to be tolerated in any drafting room. ¶ No draftsman ought to limit his effectiveness and thereby his future by drawing without it. **Send for catalog giving detail information.**

Universal Drafting Machine Co., Cleveland, O., U. S. A.

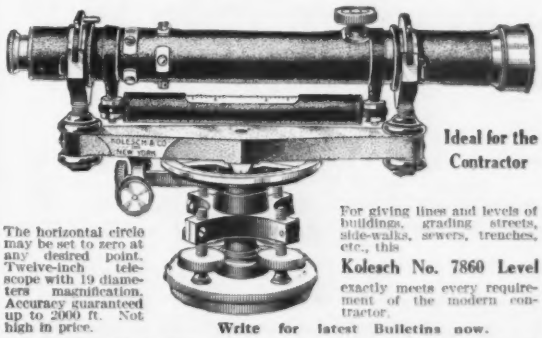
BUFF

The Buff Saleman is, the Buff Owner

Send for new Catalog No. 32.

Buff & Buff Mfg. Co.
Makers of Fine Instruments

Jamaica Plain, Boston, Mass.
1742 Monadnock Block, Chicago
50 Church St., New York



Ideal for the Contractor

The horizontal circle may be set to zero at any desired point. Twelve-inch telescope with 19 diameters magnification. Accuracy guaranteed up to 2000 ft. Not high in price.

For giving lines and levels of buildings, grading streets, side-walks, sewers, trenches, etc., this

Kolesch No. 7860 Level

exactly meets every requirement of the modern contractor.

Write for latest Bulletins now.

KOLESCH & CO., 138 Fulton St., New York

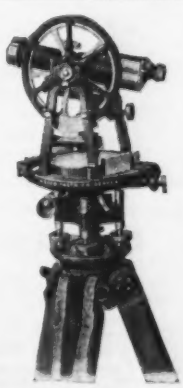
Weiss Instruments Are Reliable for Rapid Work

The Weiss Transit is in daily use and is giving excellent satisfaction.

Superior features and workmanship.

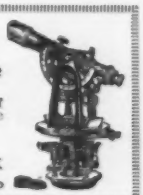
Descriptive price list on request.

The Weiss Instrument Co.
1622 Arapahoe St., Denver, Colo.



Bausch and Lomb Continuous Variation Plate

Other advantages are: fixed stadia constant, possibility of longer telescope bubble, freedom to plunge telescope, Variable Power Eyepiece. Send for Bulletin N-a.



Bausch & Lomb Optical Co.,
700 St. Paul St. ROCHESTER, NEW YORK
New York Washington Chicago San Francisco

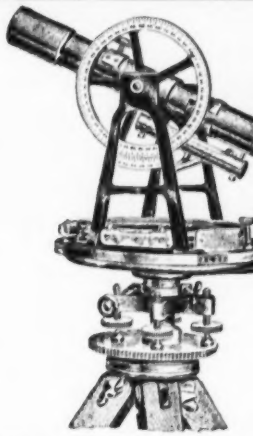
Monitor Type Transits and Leads

The clamps of Berger Instruments are of rigid construction, with no strain or give to them, and do not shift their positions when once locked.

Convincing literature sent upon request.

C. L. BERGER & SONS 35 WILLIAM STREET BOSTON, MASS.

Rent This Transit 10 Months Then It's Yours

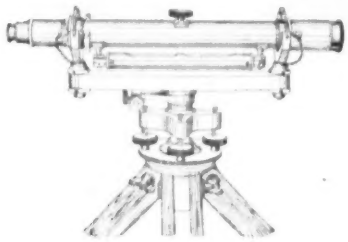


You cannot understand the astounding significance of this offer until you have read every word of this announcement. We are making it possible for every Engineer and Surveyor to own a standard instrument. We are actually making it cheaper to own your instrument than it is to rent one even occasionally.

The Transit we offer you on our "Rental Purchase Plan" is as fine as any instrument of any make to be had today. Over fifty years of instrument making backs that statement.

If you have any need at all for a Transit you cannot afford to ignore this offer.

This Transit is built to meet the requirements of any engineering work that any transit can accomplish. So splendidly constructed that a lifetime of hard knocks will not feaze it.



Rent This Level 10 Months Then It's Yours

This is the latest 1916 improved model Engineer's 18-inch Wye Level. Lenses of specially ground Jena Glass. 8-inch spirit level. Superior solid piece level head. Micrometer cut leveling screws. Improved arrangement of clamp and tangent screws. And all improvements to be found on the best Levels. Tripod, sun shade, mahogany carrying box, etc., included.

TRANSIT COMPLETELY EQUIPPED

Powerful achromatic Telescope givin a large, clear, flat field. Three spiri levels. Vertical circle. Horizonta limb. Double vernier. 5-inch compass needl Shifting center; four leveling screws, etc. Co plete in mahogany carrying case, with full s of accessories.

SURVEYING OUTFIT INCLUDED.

With every Transit is included a Surveyi Outfit, Philadelphia Rod, Sight Pole, St Tape and Marking Pins. *Mail coupon—N obligation.*

10 DAYS' FREE TRIAL

This Transit or Level must make good before we ask you to keep it. We give you 10 days' free trial and if the instrument does not come entirely up to your expectations don't keep it and don't pay a cent for its use.

10 Months' Rent Buys Transit or Level

You can own either the Transit or Level, or both instruments, in this easy way. Pay a small monthly rental for ten months and then the instrument is your absolute property. Don't buy a cheap instrument when you can own a high grade instrument on these remarkably easy terms. **Mail coupon for full details. No obligation.**

Coupon

A. S. ALOE CO., 617 Olive St., St. Louis, Mo.

Please send me complete description of your 1915 E 'Transit and 18-inch Wye Level and full details of your re chase plan. This request in no way obligates me.

Name.....

Street.....

City.....State.....

Eng. N-1

Increase Your Profits by Decreasing Your Expenses

Good tools in the hands of good workmen produce paying results.

Why discriminate in tools when you come to the table?

ECONOMY Drawing Tables will decrease the expense in your drafting room, as modern machinery has in your shop.

Remember Economy is not what a tool costs, but what it costs to use it.

It will cost nothing to investigate. **Catalogue free.**

Economy Drawing Table Co.
Toledo, Ohio

HIGGINS'

DRAWING INKS
ETERNAL WRITIN
ENGROSSING INK
TAURINE MUCILA
PHOTO MOUNTER
DRAWING BOARD
LIQUID PASTE
OFFICE PASTE
VEGETABLE GLU

ARE the FINEST and BEST GOODS of THEI

Emancipate yourself from the use of corrosive and ill-smelling inks h sives and adopt the **Higgins Inks and Adhesives.** They will be lution to you, they are so sweet, clean, well put up, and withal so

AT DEALERS GENERALLY

CHAS. M. HIGGINS & CO., Mfrs

Branches: Chicago, London 271 Ninth St., BROOKLYN

A New Self-Computing Leveling Rod

NO

Just out

minus or plus sights.

calculations to make after day's work in field.

CHICAGO STEEL TAPE COMPANY
6229-6233 Cottage Grove Avenue Chicago, Ill.

BLUEPRINTS
The WICKES

Continuous Electric. Sells at **half** the Uses **half** the **current** of others. prints up to 48" in width and of unl length.

WICKES BROS., Saginaw, M

LUFKIN Tapes

favorably known for years everywhere.
ACCURACY is the backbone of that reputation.
Send for Catalogue.

THE LUFKIN RULE Co. Saginaw, Mich. New York

Get 100 Sq. Ft. Per Minut

of

Perfect Blue Prints

By Using the

Paragon Blue Printing Machine an Paragon Blue Print Drying Machin

THE PARAGON MACHINE CO., ROCHESTER, N.

Directory of Consulting Engineers

NEW ENGLAND

Adams, H. S.,
Civil Engineer.
Wharf and Dock Construction. River and Harbor Works.
108-9 Ames Bldg., Boston, Mass.

Barbour, F. A., M.Am.Soc.C.E. M.Can.Soc.C.E.
Consulting Engineer.
Water Supply, Water Purification, Sewerage and Sewage Disposal.
Tremont Bldg., Boston, Mass.

Fay, Spofford & Thorndike
Consulting Engineers. Bridges and other Structures of Steel and Masonry. Foundations. River and Harbor Work. Frederic H. Fay, Charles M. Spofford, Sturgis H. Thorndike. 308 Boylston St., Boston, Mass.

Gray, Samuel M.,
Consulting Engineer for Municipal and Sanitary Work. Room 933 Grosvenor Building.
10 Weybosset St., Providence, R. I.

Main, Charles T., M.Am.Soc. M.E.
Plans and specifications for Textile Mills and other Industrial Plants, Water Power and Steam Power Development. Examinations and Reports on Plants with reference to their Value, Reorganization or Development.
201 Devonshire St., Boston, Mass.

Rourke & Sherman Mem. Am. Soc. C. E.
Consulting Engineers
Organization. Design and supervision of public works. Railroad work. Spanish-American projects.
Louis K. Rourke Edward C. Sherman 6 Beacon St., Boston

Stone & Webster Engineering Corporation
Constructing Engineers
Water Power Developments, Transmission Lines, Steam Power Stations, Electric Railway and Steam Railroad Work, Industrial Plants, Gas Plants, Steel or Reinforced Concrete Buildings.
New York Boston Chicago

Weston, Edmund B., M.Am.Soc.C.E. M.Inst.C.E.
Consulting Engineer. Water Supply, Filtration, Sewerage, Fire Protection, etc. 86 Weybosset St., Providence, R. I.

Weston, Robert Spurr,
M.Am.Soc.C.E.
Consulting Engineer.
For Water Purification and Sewerage Disposal.
14 Beacon St., Boston, Mass.

NEW YORK

Berggren, E. R. T.
Engineer:
Structures and Machinery. Examinations and Investigations. Tel. 7392 Audubon.
513 W. 152 St., New York

City-Wastes Disposal Co.,
(Organized from Staff of Col. Geo. E. Waring, Jr.)
Consulting Engineers.
Specialists in Drainage, Sewerage and Sewage Disposal. Preliminary Investigations and Estimates, Surveys, Plans and Supervision. Sanitary Examinations and Reports.
156 Fifth Ave., New York.

Cole & Cole
Engineers
Water Works, Reports, Valuations, Pitometer Tests.
25 Elm Street, New York City.

Hugh L. Cooper & Co.,
101 Park Avenue,
New York.
General Hydraulic Engineering, including the design, financing, construction and management of hydro-electric power plants.

Diehl, George C., M. Am. Soc. C. E.
Water Supply, Sewerage, Sewage Disposal, Refuse Disposal, Roads and Pavements, Sanitary Engineering. 575 Ellicott Sq., Buffalo, N. Y. 832 Granite Bldg., Rochester, N. Y.

Dow & Smith,
Chemical Engineers, Consulting Paving Engineers.
A. W. Dow, Ph., B., M. Am. Inst. Ch. Engrs. F. P. Smith, Ph. B., M. Am. Soc. C. E., Asphalt, Bitumens, Paving, Hydraulic Cements, Engineering Materials.
131-3 East 23rd Street, New York, N. Y.

Durham, Henry Welles
Civil Engineer.
Design and supervision of street paving, highways and municipal work. Reports and specifications.
366 Fifth Avenue, New York.

Ford, Bacon & Davis,
Engineers.
115 Broadway, New York.
New Orleans. San Francisco.

Forstall & Robison,
Engineers
Design, Operation, Appraisal, Gas and Electric Properties.
84 William Street, New York City.

Fuertes, James H., M.Am.Soc. C. E.
Civil and Sanitary Engineer.
Water Supply and Water Purification. Sewerage and Sewage Disposal.
140 Nassau St., New York.

Fuller, George W.,
Consulting Hydraulic Engineer and Sanitary Expert
Water Supply and Purification, Sewerage and Drainage, Disposal of Sewage and Refuse, Investigations of Epidemics, Water Works Valuations, Supervision of Construction and Operation.
Associate: James R. McClintock.
170 Broadway, New York City.

Gannon, Thomas J.,
M.Am.Soc.M.E.—M.Am.Soc.T.M.
Consulting Engineer on Power Plants, Water Supply and Sewage Disposal; Coal and Fuel Economy; Mechanical Equipment and Testing: Reports and Evaluations.
143 Liberty St., New York City.

Goldmark, Henry and Goldmark, C. J.,
Consulting Engineers. Canal and Railway Structures, Industrial Works, Mechanical and Electrical Installations. 103 Park Ave., New York. Kingston, Canada.

Hering & Gregory,
Consulting Engineers and Sanitary Experts.
Water Supply and Water Purification, Sewerage, Sewage Disposal and Refuse Disposal.
Rudolph Hering, John H. Gregory.
170 Broadway, New York City.

Hazen, Whipple & Fuller
Consulting Hydraulic and Sanitary Engineers. Water Supply and Sewerage.
Allen Hazen, G. C. Whipple, W. E. Fuller, F. F. Longley, C. M. Everett, L. N. Babbitt,
30 East 42nd St., New York City.

Hill, William R., M. Am. Soc. C.E.
Consulting Engineer.
Water Works, Steam Railroads and Canals.
53 State Street, Albany, N. Y.

Hill, Nicholas S., Jr. and Ferguson, S. F.,
Consulting Engineers.
Water Supply and Sewage Disposal. Evaluations and Reports. Laboratory for Analysis of Water and Sewage and for Testing Cement, Sands, Coal and Metals. Steam and Hydraulic Power Plants.
100 William Street, New York.

Hooper-Falkenau Engineering Co.
Industrial Engineers and Architects.
Industrial Plants. Power Plants. Business Buildings.
Special Machinery. Appraisals. Reports.
Woolworth Building, New York.

Hopkins, Charles C., M.Am. Soc.C.E.
Civil and Sanitary Engineer.
Water Supply, Sewerage, Water Power, etc.
349 Cutler Bldg., Rochester, N. Y.

Knight & Son, C. W.,
Hydraulic and Sanitary Engineers.
Plans, Estimates, Reports, Supervision. Water Supply, Water Power, Water and Sewage Purification, Land Drainage.
Rome, N. Y.

Landreth, Olin H.,
M.Am.Soc.C.E. M.Am.Soc.M.E.
Consulting Engineer for Hydraulic and Sanitary Works, Valuation for Investment, Condemnation and Indemnity.
156 Fifth Ave., New York.
Union College, Schenectady, N. Y.

Lederle & Provost,
Sanitary Experts and Hydraulic Engineers.
Water Supply, Sewage Purification.
39 W. 38th St., New York.

Continued:
Additional cards appear on the page following.

Moisseiff Leon S. M. Am. Soc. C. E.
Engineering Construction and Investigations.
Bridges and Structures. Steel and Concrete.
69 Wall St., New York.

Moran, Daniel E., C.E
M.Am.Soc.C.E. M.Am.Soc.M.E.
Consulting Engineer.
Foundations for Dams, Bridges, Buildings, Subaqueous Work.
55 Liberty St., New York.

Parsons, H. de B.,
Consulting Engineer. Hydraulic and Steam Developments, Municipal and Industrial Engineering. Designs — Reports — Appraisals.
22 William St., New York.

Pollock, Clarence D., M. Am. Soc. C. E.
Consulting Engineer.
Pavements, Specifications, Supervision of Municipal Works.
Park Row Building. New York.

Potter, Alexander,
Consulting Engineer.
Hydraulics Sanitation, Concrete, Structures. Tel. 5501 Cortlandt.
50 Church Street, New York.

Potts, Clyde, M.Am.Soc.C.E.
Civil and Consulting Engineer.
Water Supply, Power; Sewerage and Sewage Disposal.
30 Church St., New York City.

Robinson & Wagner,
Experts in Sewage Disposal.
37-39 East 28th Street, New York.

Sanderson & Porter,
Engineers.
52 William Street, New York; Nevada Bank Bldg., San Francisco.

Tribus & Massa,
Consultation, Design, Supervision, Management, Appraisal.
Water, Sewage, Refuse, Power, Pavements.
86 Warren St., New York.

Wallace & Co., Joseph H.,
Consulting Industrial Engineers.
Industrial and Power Plants—Hydraulic Developments — Investigations — Consultation — Reports.
New York. Montreal. London.

Waring, Chapman & Farquhar,
Sanitary Engineering. Sewerage, Sewage Disposal, Drainage, etc.
874 Broadway, New York, N. Y.

White Companies, The J. G.,
Financiers—Engineers
Contractors—Managers.
43 Exchange Pl., New York.

Yates & Yates.
Steel and Reinforced Concrete. Industrial and Power Plants. Reports, Designs, Valuations.
120 Broadway, New York City.

Young, C. G.,
Engineering and Construction. Plans, Methods, Operation. Reports for Financing. American — Foreign Experience.
14 Wall Street, New York.

NEW JERSEY

Simpson, John T. M.Am. Soc. C.E.
Fireproof Building Construction.
1224 Essex Building, Newark, N. J.

PENNSYLVANIA

Chester & Fleming,
Hydraulic, Sanitary and Mechanical Engineers.
Union Bank Building, Pittsburgh, Pa.

Day & Zimmermann,
Engineers.
Layout, Design, Construction of Industrial Plants.
Engineering, Construction, Operation of Public Service Properties.
Reports—Valuations.
611 Chestnut St., Phila.

Duff, Samuel E.,
Consulting, Designing and Supervising Engineer.
Appraisals, Reports.
Empire Building, Pittsburgh, Pa.

Fayette Engineering Co.,
Civil, Mining and Consulting Engineers.
L. C. Mechling, E. L. Zearley.
Coal, Coke Plants.
Uniontown, Pa.

Gannett, Farley
Consulting Engineer.
Hydrographic Investigations. Flood Control. Dams, Valuations and Reports. Designs and Estimates. Practice Before State Departments and Commissions.
Farley Gannett. Theodore E. Seelye.
Associated with the Harrisburg Water Laboratories Chemical and Bacteriological Examinations
Telegraph Building
Harrisburg, Penna.

Kennedy, Julian,
Engineer.
Pittsburgh, Pa., U.S.A.
Cable Address: "Engineer, Pittsburgh."

Ledoux, J. W.,
Consulting Engineer.
Water Works, Hydraulics, Reports and Valuation.
112 No. Broad St., Philadelphia.

Moore W. E. & Company
Engineers.
Reports, Designs, Supervision Public Service Properties. Power Developments, Distribution and Application.
Union Bank Building, Pittsburgh, Pa.

Swensson, Emil, M.Am.Soc.C.E.
Consulting and Constructing Engineer.
Pittsburgh, Penn.

Wilkins Company, The W.G.,
Engineers and Architects.
Westinghouse Bldg., Pittsburgh, Penn.; Robson-Prichard Bldg., Huntington, W. Va.

CHICAGO

Aetna Engineering Bureau,
Civil and Sanitary Engineers.
Pavements, Water Supply, Sewers.
17 North La Salle St., Chicago.

Allen & Garcia Company,
Andrews Allen, C. E., John A. Garcia, E. M.
Consulting Bridge, Structural and Mining Engineers.
Plans, Specifications. Superintendence for Bridges and Structures in Steel or Concrete. Design and Construction of complete Coal Mining Plants. Examination, Reports and Appraisals of Coal Mining and other Properties.
McCormick Bldg., Chicago.

Alvord, John W., Burdick, Chas. B.,
Consulting Engineers. Water Supply, Sewerage, Water Power.
Hartford Bldg., Chicago.

Arnold Company, The,
Bion J. Arnold, President.
Engineers and Constructors.
Electrical Civil, Mechanical. Reports and Estimates on Engineering Projects. Engineering—Specifications and Plans Covering Complete Properties. Construction of Complete Properties and Preliminary Operation of Finished Plant.
105 South LaSalle Street, Chicago, Illinois.

Byllesby, H. M. & Company
(Incorporated)
Purchase, Finance, Construct and Operate Electric Light, Gas, Street Railway and Water Power Properties.
Examination and Reports.
Utility Securities Bought and Sold.
Continental and Commercial Bank Bldg., Chicago. Trinity Bldg., New York.
Tacoma, Wash.

Condron Company,
Architectural and Structural Engineers.
Reinforced Concrete and Steel Structures.
Monadnock Bldg., Chicago, Ill.

Maury, Dabney, H.,
M.Am.Soc.C.E. M.Am.Soc
Consulting Engineer.
Works, Power Plants, Sew
Appraisals. 1137-8 Mons
Blk., Chicago.

McMeen and Miller
Electrical and Mechanica
gineers.
S. G. McMeen. K. B.
L. S. Keith.
1454 Monadnock Block, C
407 Electric Building, Cle

Metcalf & Eddy, Co
Water Works, Sewerage, D
of Sewage and Industrial W
Supervision of Operation.
tions.
14 Beacon Street, Boston,
Harris Trust Bldg., Chica

Isham Randolph & Co
Consulting Engineers.
Water Power, Sewerag
Water Supply, Land Dr
River and Harbor Works
roads, Bridges and Bu
1827 Commercial Nations
Building, Chicago.

CENTRAL WEST

Brenneke & Fay, M.
Consulting Engineers.
Steel and Concrete Bridg
ducts and Buildings.
tions. 1200-04 Fullerton
St. Louis.

Burns & McDonnell.
Consulting Engineers.
sals, Rate Investigations.
Works, Sewers, Lighting
Interstate Bldg., Kansa
Mo.

Chase, Charles P.,
Hydraulic Engineer, Sani
pert. Water Works, Wate
Sewerage. Chase Block,
Ave., Clinton, Iowa.

Fargo Engineering Co
Hydraulic Engineers.
Specialize in the design o
Plants and Dams on Soi
dations.
Jackson, Michigan.

Federal Engineering
pany,
Civil and Architectural E
218-219 Stephenson Bld
waukee, Wis.

Flad & Co., Edward,
Consulting Engineers.
Water Supply and Sewe
Municipal Engineering.
De Menil Bldg., St. Lou

Hatton, T. Chalkley,
M.Am.Soc.C.E. M.A
Assoc.
Consulting Engineer.
Works and Sewerage Sy
Milwaukee, Wis., C

Hedrick & Cochrane,
Designs, Estimates and
rision of Steel and R
Concrete and other st
506 Inter-State Bldg.
City, Mo.

Luten, Daniel B.,
Designing and Consulting Engineer. Reinforced Concrete Bridges Exclusively. Associate Engineers in each State.
Indianapolis.

Turner, C. A. P.,
Consulting Engineer.
M. Am. Soc. C. E. Reinforced Concrete and Structural Steel Bridges, Buildings and Manufacturing Plants.
627 First Ave. N.
Minneapolis, Minn.

Williams, Gardner S.,
Mem. Am. Inst. Cons. Engr.,
Mem. Am. Soc. C. E.,
Mem. Am. W. W. Assoc.,
Mem. N. E. W. W. Assoc.
Consulting Engineer.
Hydraulic Investigations, Water Power and Electrical Developments, Water Supply Systems. Designs, Estimates, Plans, Specifications, Supervision of Construction, Surveys, Reports, Appraisals.
Cornwell Bld'g., Ann Arbor, Mich. Corn Exchange Bank Bld'g., Chicago, Ill.

SOUTHERN STATES

Brown & Clarkson,
W. N. Brown, C. D. S. Clarkson.
Civil and Mining Engineers.
Specialists in Topographic Engineering.
Oxford Bldg., 14th & N. Y. Ave., Washington, D. C.

Dabney Engineering Co., The, M.Am.Soc.C.E.
T. G. Dabney. A. L. Dabney.
Municipal Improvements, Drainage. 81 Porter Bldg., Memphis, Tenn.

Elrod, Henry Exall,
M.Am.Soc.C.E.
M.Am.Soc.M.E.
Water Works, Sewers and Sewage Disposal, Power Plants, Appraisals and Reports. Southwestern Life Building, Dallas, Texas.

Elliott, C. G., C. E. M. Am. Soc. C. E.
Consulting Drainage Engineer.
Formerly Chief of Drainage Investigations, U. S. Dept. of Agriculture. Reports on Drainage Plans and Projects. 503 McLachlen Building, Washington, D. C.

Knowles, Morris, M.Am.Soc. C.E.
Water Supply and Purification, Sewerage and Sewage Disposal. Investigations, Designs.
Pittsburgh, Pa.; Birmingham, Ala.

Morgan Engineering Co.,
Civil Engineers.
Reclamation of Wet and Overflowed Lands.
Memphis, Tennessee.

PACIFIC STATES

American Engineering Corporation,
C. E. Grunsky, President.
All Branches of Engineering.
Mechanics' Institute Bldg., San Francisco, Cal.

Snyder, C. H., M.Am. Soc. C. E.
Designing and Consulting Engineer.
Bridges, Buildings, Foundations and Industrial Plants, Estimates and Reports. Steel and Reinforced Concrete Construction. 251 Kearny St., San Francisco, Calif.

Whitham, Paul P.,
Railways, Terminals, Docks, Industrial Bldgs., Grain Elevators, Freight Handling Equipment, City Planning. Reports, Estimates, Designs, Superintendence.
New York Block, Seattle, Wash.
Phone Elliott 4582

CANADA

Robinson, A. W.,
M.Am.Soc.C.E. M.Am.Soc.M.E.
Mechanical Engineer. Dredging Machinery of Every Type Designed for Special Conditions. 14 Phillips Square, Montreal, Can.

INSPECTING AND TESTING ENGINEERS

Allentown Testing Laboratory,
Engineers and Chemists. Mill Inspection and Laboratory Tests. Structural and Road Materials.
New Laboratories, Allentown, Pa.

Electrical Testing Laboratories, Inc., Electrical, Photometrical and Physical Tests. Inspection & Tests of Electrical and Engineering Materials. Main Office and Laboratories 80th St. and East End Ave., New York.

Gulick-Henderson Co.,
Inspecting and Testing Engineers.
Pittsburgh, Chicago, New York, San Francisco.

Hunt, Robert W. & Co.,
Robert W. Hunt, Jno. J. Cone, Jas. Hallsted, D. W. McNaugher.
Bureau of Inspection, Tests and Consultation. Inspection and Testing of All Engineering Materials.
Established Offices in—Chicago, Pittsburgh, London, San Francisco, Seattle, New York, St. Louis, Montreal, Toronto, Mexico City, Vancouver.

Jones Company, Morgan T.,
Consulting and Inspecting Engineers.
Inspection of Rails and Fastenings, Cars, Locomotives, Bridges and Buildings—Cast Iron Pipe, etc. Cement Testing, Chemical Analysis and Physical Tests.
General Offices: Monadnock Block, Chicago. 15 Broad Street, New York City. 313 Wabash Building, Pittsburgh, Pa.

Hildreth & Company,
Consulting and Inspecting Engineers.
Philadelphia, Pittsburgh, Chicago, Mills Bldg., 15 Broad St., New York.

McKenna, Dr. Charles F.,
Consulting Chemist and Chemical Engineer.
Expert in Technology and Testing of Materials.
Investigations and Reports for investors upon industrial processes.
50 Church St., New York City.

Pittsburgh Testing Laboratory,
Engineers and Chemists.
Inspection of Rails, Cars, Bridges and Buildings, Pipe, Boilers, Engines, etc.; Cement Testing and Inspection at Mills before Shipment. Chemical and Physical Tests. Consultation and Reports.
"P.T.L." Bldg., Pittsburgh; 50 Church St., New York; 1330 Monadnock Block, Chicago; 651 Howard Street, San Francisco; 204 White Bldg., Seattle; 1127 Chemical Bldg., St. Louis; 211 Bell Block, Cincinnati; 509 Woodward Bldg., Birmingham; 305 Practorian Bldg., Dallas.

Underwriters' Laboratories, Inc.,
under the direction of the National Board of Fire Underwriters, W. H. Merrill, Manager. Principal office and testing station, Chicago. Branch offices in all principal cities in the United States and Canada.
New York Office, 135 William Street. London Office, 48 Westminister Palace Gardens.

ENGINEERING SCHOOLS AND COLLEGES

Clarkson College of Technology,
Civil, Electrical, Mechanical, Chemical Engineering. Small Classes. Full Equipment. Potsdam, N. Y.

College of Engineering,
Courses in Civil, Mechanical, Electrical, Mining, Sanitary, Municipal, Architectural Engineering. Thorough, practical, economical. Enter any time. No matriculation or registration fees. Expenses 1-3 to 1-2 less than at other first class schools. School year,—Four Quarters of 12 weeks each. Length of Courses 120 weeks. Save one year and $1000. Experienced Instructors. Splendid Laboratories. For Catalog, Bulletins or information address Albert Edwin Smith, President, Ohio Northern University, Ada, O.

Montana State School of Mines,
Located in a Great Mining District. Thorough course of four years in Mining and Metallurgy equips young men for immediate service in Mines and Reduction Works. For information address Registrar.
Butte, Montana.

New York University School of Applied Science,
Departments of Civil, Mechanical, Chemical, and Industrial Engineering.
For announcements or other information address Chas. Henry Snow, Dean.
University Heights, N. Y. City.

Northwestern University College of Engineering
Five years of broad, thorough training; small classes in which student receives individual attention. Unsurpassed opportunities to meet engineers, and to keep in touch with engineering. New organization unhampered by embarrassing traditions. Write for "Best Preparation for Engineering" and book of views.
John F. Hayford, Director, Evanston, Ill.

Pennsylvania Military College,
51st Year. The institution offers thorough scientific and military instruction so combined as to give superior equipment for either professional or business life. Degrees granted—Civil Engineering (C.E.), Chemistry (B.S.), Arts (A.B.) Preparatory Courses also.
Catalogs of Col. C. E. Hyatt, President.
Chester, Pa.

Rensselaer Polytechnic Institute, The
Engineering and Science.
Courses in Civil Engineering (C.E.)
Mechanical Engineering (M.E.),
Electrical Engineering (E.E.),
Chemical Engineering, (Ch.E.)
and General Science (B.S.).
Graduate Courses leading to Masters' and Doctors' Degrees.
Also special courses. Unsurpassed new Chemical, Physical, Electrical, Mechanical and Materials Testing Laboratories.
Troy, N. Y.

The Cards
appearing on these pages go before over twenty thousand people weekly.
You can enlarge your field of business at small expense through this directory.
New cards appear only with the first issue of each month.
Write for rates now.

Buyers Cyclopedia

Accumulators
Southwark Fdry. & Mach. Co., Philadelphia, Pa.

Asbestos Products
Carey Co., Philip, 18 Wayne Ave., Lockland, Ohio.
Johns-Manville Co., H. W., New York.

Ash Handling Machinery
Jeffrey Mfg. Co., The, 923 N. 4th St., Columbus, O.
Webster Mfg. Co., The, Tiffin, Ohio.

Asphalt
Carey Co., Philip, 18 Wayne Ave., Lockland, Ohio.
Standard Oil Co., Newark, N. J.

Balances
Ainsworth & Sons, Wm., Denver, Colo.

Ballast Unloaders
Marion Steam Shovel Co., Station M, Marion, O.

Barges, Steel
American Bridge Co., 30 Church St., N. Y. City.

Bearings and Bushings (Oilless)
Metaline Co., The, 6 West Ave., L. I. City, N. Y.
Made in all sizes for sheaves and like bearings.

Belting
Robins Conveying Belt Co., 14 Park Row, N. Y. C.

Bins, Storage
Ransome Concrete Mchy. Co., Dunellen, N. J.

Blasting Supplies
Aetna Explosives Co., Inc., 2 Rector St., N. Y. C.

Blocks
Boston & Lockport Block Co., Boston, Mass.
Patterson Co., W. W., Pittsburgh, Penn.
Pittsburgh Block & Mfg. Co., Pittsburgh, Penn.

Blow-Pipes and Burners
American Gas Furnace Co., 24 John St., N. Y. C.

Blowers
American Blower Co., Detroit, Mich.
Seventy-five cu.ft. and upward.
Southwark Fdry. & Mach. Co., Philadelphia, Pa.

Blowers, Pressure
American Gas Furnace Co., 24 John St., N. Y. C.

Blue Print Dryers
Paragon Mach. Co., The, Rochester, N. Y.

Blueprinting Machines
Keuffel & Esser Co., Hoboken, N. J. N. Y. City.
Kolesch & Co., New York City.
Paragon Mach. Co., The, Rochester, N. Y.
Wickes Bros., Saginaw, Mich.
Williams, Brown & Earle, Philadelphia, Penn.

Boilers
Babcock & Wilcox Co., 85 Liberty St., N. Y. C.
Branch offices in principal cities.
"B & W," "Sterling" and "Rust" water-tube boilers.
Lidgerwood Mfg. Co., 96 Liberty St., New York.
Struthers-Wells Co., Warren, Penn.

Bolts, Expansion
Parker Supply Co., 522 W. 45th St., N. Y. City.
"Parker" expansion bolts, for fastening to brick, stone, concrete. "Can't turn in the hole."

Books
McGraw-Hill Book Co., Inc., 239 W. 39th St., New York City.
Trautwine Co., 257 S. 4th St., Philadelphia, Pa.
"Trautwine" Civil Engineers' Pocketbook.
Wiley & Sons, Inc., John, 432 4th Ave., N. Y. C.

Brakes, Air
Westinghouse Air Brake Co., Pittsburgh, Penn.

Bridges and Buildings
American Bridge Co., 30 Church St., N. Y. City.
Berlin Construction Co., Berlin, Conn.
Blaw Steel Construction Co., Pittsburgh, Penn.
Case Crane & Eng'r'g Co., Columbus, Ohio.
Chicago Bridge & Iron Co., Chicago, Ill.
Eastern Bridge & Structural Co., Worcester, Mass.
Fort Pitt Bridge Works, Pittsburgh, Penn.
Kenwood Bridge Co., Chicago, Ill.
Lackawanna Bridge Co., New York.
McClintic-Marshall Co., Pittsburgh, Penn.
Milwaukee Bridge Co., Milwaukee, Wis.
Minneapolis Steel & Mchry. Co., Minneapolis.
Missouri Valley Bridge & Iron Co., Leavenworth, Kan.
Morava Construction Co., Chicago, Ill.
Mount Vernon Bridge Co., Mt. Vernon, Ohio.
Penn Bridge Co., Beaver Falls, Penn.
Pennsylvania Steel Co., Steelton, Penn.
Phoenix Bridge Co., Phoenixville, Penn.
Riter-Conley Mfg. Co., Pittsburgh, Penn.
Riverside Bridge Co., Martins Ferry, Ohio.
Scherzer Rolling Lift Bridge Co. ,The, Chicago, Ill.
Shoemaker & Co., Lewis F., Pottstown, Penn.
Snare & Triest Co., The, Woolworth Bldg., N. Y. C.
Snead Architectural Iron Works, Louisville, Ky.
Strobel Steel Construction Co., Chicago, Ill.
Wisconsin Bridge & Iron Co., Milwaukee, Wis.

Bridges, Bascule
American Bridge Co., 30 Church St., N. Y. City.
Scherzer Rolling Lift Bridge Co. ,The, Chicago, Ill.
Strauss Bascule Bridge Co., Chicago, Ill.
Strobel Steel Construction Co., Chicago, Ill.

Buckets, Concrete
Hayward Co., The, 50 Church St., N. Y. City.
Smith Co., The T. L., 1170 32nd St., Milwaukee.
Union Iron Works, Hoboken, N. J.

Buckets, Dragline Scraper
Hayward Co., The, 50 Church St., N. Y. City.
Insley Mfg. Co., Indianapolis, Ind.

Buckets, Dredging
American Bridge Co., 30 Church St., N. Y. City.
Browning Co., The, Cleveland, Ohio.
Hayward Co., The, 50 Church St., N. Y. City.

Buckets, Orange Peel and Clam Shell
Haiss Mfg. Co., 142nd St. and Rider Ave., N. Y. C.
Hayward Co., The, 50 Church St., New York City.
Standard and special sizes. Capacities 100 cubic inches up. Equipped with power wheel rope guards. All parts interchangeable.
Industrial Works, Bay City, Mich.
Designed for quick attachment or removal.
Orton & Steinbrenner Co., Chicago, Ill.
Owen Bucket Co., 533 Rockefeller Bldg., Cleveland, Ohio.
One-half to 3 cu.yd. cap. All-steel construction. Wearing parts bushed and lubricated.
Union Iron Works, Hoboken, N. J.
Whiting Foundry Equipment Co., Harvey, Ill.

Building Paper
Barrett Mfg. Co., New York.
Berlin Mills Co., Portland, Maine.
Carey Co., Philip, 18 Wayne Ave., Lockland, Ohio.

Building Specialties
Berger Mfg. Co., The, Canton, Ohio.

Cableways
American Steel & Wire Co., Chicago, Ill.
Flory Mfg. Co., S., Bangor, Penn.
Lidgerwood Mfg. Co., 96 Liberty St., New York.
Waterbury Co., The, 63 Park Row, N. Y. City.

Caissons
American Bridge Co., 30 Church St., N. Y. City.
Struthers-Wells Co., Warren, Penn.

Cars, Contractors
Insley Mfg. Co., Indianapolis, Ind.
Union Iron Works, Hoboken, N. J.
Western Wheeled Scraper Co., Aurora, Ill.

Cars, Dump
Insley Mfg. Co., Indianapolis, Ind.

Cars, Industrial
Ramapo Iron Works, Hillburn, N. Y.

Carts, Concrete
Insley Mfg. Co., Indianapolis, Ind.
Ransome Concrete Mchy. Co., Dunellen, N. J. Cable: Racomaw. Branches: Chicago, Philadelphia, Boston, New York, Columbus, Ohio.

Casings, Wood
Michigan Pipe Co., Bay City, Mich.
Standard Wood Pipe Co., Williamsport, Penn.

Castings, Iron and Steel
Central Foundry Co., 90 West St., N. Y. City.
Fox & Co., John, 253 Broadway, New York City.
McConway & Torley Co., Pittsburgh, Penn.
McKim Foundry & Machine Co., Lockport, N. Y.
Sessions Foundry Co., Bristol, Conn.
Standard Cast Iron Pipe & Fdry. Co., Bristol, Pa.
Warren Fdry. & Machine Co., 11 Bway., N. Y. C.

Castings, Malleable Iron
Marion Malleable Iron Works, Marion, Ind.

Castings (Street and Sewer)
Central Fdry Co., 90 West St., N. Y. City.
Sessions Foundry Co., Bristol, Conn.

Cement for Iron
Smooth-On Mfg. Co., Jersey City, N.

Cement (Fire Brick)
Johns-Manville Co., H. W., New York

Cement Making Machinery
International Steam Pump Co., 115 Bw
Raymond Bros. Pulverizer Co., Chica
Smith Engineering Works, 3184 Locu
waukee.
"Telsmith" primary breakers, rigid with short frame, parallel stroke.
Vulcan Iron Wks., 1736 Main St., Wi

Cement, Portland
Alpha Portland Cement Co., Easton, Pa
New York (50 Church St.), Chi
quette Bldg.), Boston (Board of T
adelphia (Harrison Bldg.), Pittsbu
Bldg.), Buffalo (Builders Exchange
(Builders Exchange), Savannah (Na
Bldg).
Cap. 25,000 bbl. daily, storage for 2
Shipped in cotton or paper bags
countries in tongue-and-grooved b
with waterproof paper.
Atlas Portland Cement Co., 30 Bro
York City. Cable: Atcement.
In bags or barrels; mill cap. 50,00
Dexter Portland Cement Co., Nazare
French & Co., Samuel S., Philadelph
"French's" brand.
Hartranft Cement Co., Wm. G., Phila
Lawrence Cement Co., 1 Broadway,
Lehigh Portland Cement Co., Allen
Chicago, Ill. Cable: Leporcem,
Branches: New York City, Bosto
phia, Buffalo, Savannah, New
Minneapolis, Minn.; Des Moines,
kane, Wash. Mills: Fogelsville,
Pa.; West Copley, Pa.; Mitchell,
City, Iowa; Metaline Falls, Wash.
Nazareth Cement Co., Nazareth, Pe

Cement, Portland White
Atlas Portland Cement Co., 30 Broad
Lawrence Cement Co., 1 Broadway,

Centers, Steel Collapsible
Blaw Steel Construction Co., Pittsbu

Chain
Pittsburgh Block & Mfg. Co., Pittsbu

Chains, Transmission
Jeffrey Mfg. Co., The, Columbus, Oh
Webster Mfg. Co., The, Tiffin, Ohio.

Channeling Machines
Ingersoll-Rand Co., 11 Broadway, Ne
Sullivan Mach. Co., 122 S. Mich. A

Chimneys, Concrete
Heine Chimney Co., 123 W. Madison
Kellogg Co., M. W., 90 West, N. Y.
Boston, Philadelphia, Indianapolis
Weber Chimney Co., McCormick Bl
Ill. Aguias, 104, Havana, Cuba.
Wiederholdt Construction Co., St.

Chimneys, Radial Brick
Bergen & Lindeman, Inc., 30 Church
Branches: Philadelphia, Boston.
Custodis Chimney Constr. Co., Alph
Bldg., New York City.
Heine Chimney Co., 123 W. Madison
Heinecke, Inc., H. R., 147 4th Ave.
Branches: Phila., Boston, Chicago,
Kellogg Co., M. W., 90 West, N. Y.
Boston, Philadelphia, Indianapolis
Wiederholdt Construction Co., St.

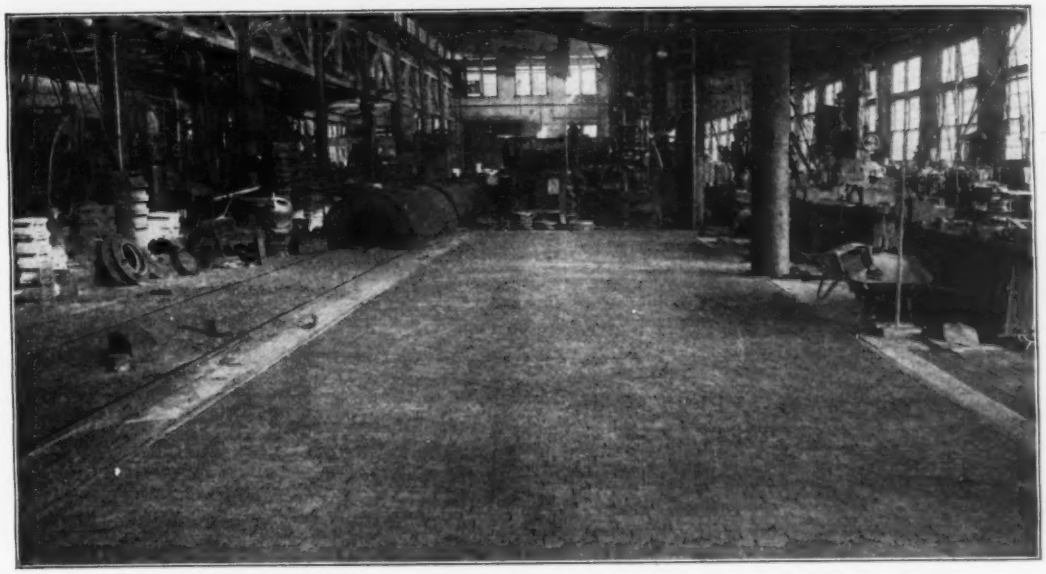
Chimneys, Tile
Wiederholdt Construction Co., St.

Chutes for Concrete
Ransome Concrete Mchy. Co., Du
Cable: Racomaw. Branches: Ch
delphia, Boston, New York, Colu
Made of high carbon steel. Inter

Coal and Ore Handling Machinery
Bartlett & Snow Co., The C. O., Cle
Haiss Mfg. Co., 142nd St. and Rider
Hayward Co., The, 50 Church St., N
International Steam Pump Co., 115 B
Jeffrey Mfg. Co., The, 923 N. 4th St.,
Lidgerwood Mfg. Co., 96 Liberty St.,
Link-Belt Co., Philadelphia, Chicag
"Peck" overlapping bucket conve
Orton & Steinbrenner Co., Chicago,

Kreolite Wood-Block Floors

"They outlast the factory"



Photograph shows view of Kreolite Wood Block Floor in the plant of the Vulcan Iron Works, Wilkes-Barre, Pa.

A Plank Floor Was Taken Up and a Kreolite Floor Put in Its Place

THE Vulcan Iron Works, Wilkes-Barre, Pa., made a thorough investigation of the experiences of other factories and plants before they changed from the old style plank floor to the modern Kreolite Wood Block Floor.

THE old floor was continually being repaired, hard to truck over and tiresome to the workmen through its unevenness.

THE Kreolite Wood Block Floor shown above will not only outwear a plank, concrete or brick floor, but also stimulates production by giving a smooth surface to truck over and one that is very comfortable for the workmen.

KREOLITE Wood Block Floors have been installed by hundreds of concerns because they make possible a reduction in repair and labor costs and an increase in shop efficiency.

We have a copy of "Factory Floors" for you. Shall we send it?

The Jennison-Wright Company

320 Huron Street **Toledo, Ohio**

Pioneers in Perfect Floors

Webster Mfg. Co., The, Tiffin, Ohio.
Whiting Foundry Equipment Co., Harvey, Ill.

Coal Storage Systems
American Bridge Co., 30 Church St., N. Y. City.
Fairbanks, Morse & Co., Chicago, Ill.

Column Clamps
New England Column Clamp Co., Boston, Mass.

Compounds, Waterproofing
Barrett Mfg. Co., New York, N. Y.
Smooth-On Mfg. Co., Jersey City, N. J.

Compressors, Air
American Well Works, Aurora, Ill.
Chicago Pneumatic Tool Co., Chicago, Ill.
Fuel oil, gas, steam power driven.
Fairbanks, Morse & Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Bway., New York, N. Y.
Branches: Boston, Phila., Pittsburgh, Cleveland, Chicago, El Paso, Seattle, San Francisco, Birmingham, St. Louis, Los Angeles, Butte, Denver, Duluth, Knoxville, New Orleans, Salt Lake City.
"Imperial" and "Ingersoll-Rogler."
Stationary and portable, power driven and steam driven.
International Steam Pump Co., 115 Bway., N. Y. C.
McKiernan-Terry Drill Co., 234 Bway., N. Y. C.
Norwalk Iron Works, South Norwalk, Conn.
Southwark Fdry. & Mach. Co., Philadelphia, Pa.
Sullivan Mach. Co., 122 S. Mich. Ave., Chicago.
Westinghouse Air Brake Co., Pittsburgh, Penn.

Compressors, Gas and Ammonia
International Steam Pump Co., 115 Bway., N. Y. C.
Norwalk Iron Works, South Norwalk, Conn.

Concrete Construction
Raymond Concrete Pile Co., 140 Cedar St., New York, N. Y. Branches: Chicago, Pittsburgh, Boston, Baltimore, Philadelphia, Atlanta, Detroit, Cleveland, St. Louis, Portland, Oregon; San Francisco, Los Angeles, Omaha, Cincinnati, St. Paul, Kansas City and Montreal.
Cast-in-place and pre-cast concrete piles, concrete interlocking sheet piles, docks, wharves, bulkheads, roads, bins, monolithic foundations, retaining walls, jetties, etc.
See ad. always on page 3.
Trussed Concrete Steel Co., Dept. 12, Youngstown, Ohio.
"Kahn" reinforcement and specialties for concrete.
Representatives in principal cities.
Weber Chimney Co., McCormick Bldg., Chicago, Ill.
Reinforced concrete chimneys and towers.

Concrete Reinforcement
American Steel & Wire Co., Chicago, Ill.
Berger Mfg. Co., The, Canton, Ohio.
Special plates for reinforcements.
See advertisement.
Franklin Steel Works, Franklin, Penn.
¼ to 1¼" bars. Mill cap. 75,000 tons per year. Round, square or square-twisted steel bars.
Lackawanna Steel Co., Lackawanna, N. Y.
Branches: New York, Boston, Buffalo, Philadelphia, Cleveland, Cincinnati, Chicago, Detroit, St. Louis, Atlanta, San Francisco.
Laclede Steel Co., St. Louis, Mo. Chicago Office: 332 S. Michigan Ave. Works: Madison, Ill.
Page Woven Wire Fence Co., Monessen, Penn.
Eighteen to 54" wide in multiples of 1½ and 3". Rolls up to 600 ft.
A wire fabric.
Eastern Agents: W. N. Wight & Co., 5 Beekman St., New York City.
Trussed Concrete Steel Co., Dept. 12, Youngstown, Ohio.
"Kahn Sys." Reinf., "Kahn" bars, "Rib" bars, "Rib" metal lath, "Kahn" mesh, "Hy Rib" Floretyles, Floredoms, column hooping.
Representatives in principal cities.

Condensers
Alberger Pump & Condenser Co., New York City.
Blake & Knowles Steam Pump Works, The, East Cambridge, Mass.
Cameron Steam Pump Works, A. S., 11 Broadway, New York City.
International Steam Pump Co., 115 Bway., N. Y. C.
Southwark Fdry. & Mach. Co., Philadelphia, Pa.
Worthington, Henry R., 115 Broadway, N. Y. City.

Conduit
Johns-Manville Co., H. W., New York City, N. Y.
Fibre, etc., for steam and electrical purposes.
National Tank & Pipe Co., Portland, Oregon.
Wyckoff Pipe & Creosoting Co., New York City.

Contractors, General
Gillespie Co., T. A., 50 Church St., N. Y. City.

Conveyors
International Steam Pump Co., 115 Bway., N. Y. C.
Jeffrey Mfg. Co., The, 923 N. 4th St., Columbus, O.
Ohio Loco. Crane Co., Mansfield St., Bucyrus, O.
Robins Conveying Belt Co., 14 Park Row, N. Y. C.
Webster Mfg. Co., The, Tiffin, Ohio.

Cooling Towers
International Steam Pump Co., 115 Bway., N. Y. C.
Worthington, Henry R., 115 Bway., N. Y. City.

Corner Bead Metal
Berger Mfg. Co., The, Canton, Ohio.
Trussed Concrete Steel Co., Dept. 12, Youngstown, Ohio.

Couplers, Car
McConway & Torley Co., Pittsburgh, Penn.

Couplings, Reinforcing Bar
Marion Malleable Iron Works, Marion, Ind.

Cranes
Southwark Fdry. & Mach. Co., Philadelphia, Pa.

Cranes, Locomotive
Browning Co., The, Cleveland, Ohio.
Four to 8 wheel—any gauge. Cap. 10 to 100 tons. Full circle revolving cranes, self-propelling. Operated by steam or electricity.
Industrial Works, Bay City, Mich.
Five to 160 tons cap. Steam, electric, gasoline.
Link-Belt Co., Philadelphia, Chicago, New York.
All standard sizes and capacities.
Ohio Loco. Crane Co., Mansfield St., Bucyrus, O.
Five to 50 tons.
Steam, electric, compressed air, oil or gasoline engine power equipment.
Orton & Steinbrenner Co., Chicago, Ill.
Five- to 150-ton. All types and equipment.

Cranes, Traveling
Case Crane & Engineering Co., Columbus, Ohio.
Northern Engineering Works, Detroit, Mich.
Southwark Fdry. & Mach. Co., Philadelphia, Pa.
Terry & Tench Co., Inc., 70 E. 45th St., N. Y. C.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Wrecking
Browning Co., The, Cleveland, Ohio.
Ohio Loco. Crane Co., Mansfield St., Bucyrus, O.

Talk about efficiency—how about the lost motion in getting definite information from advertisers—Order now from the Cyclopedia

Creosoting
American Creosote Wks., New Orleans, La. (Sta.B).
Barber Asphalt Paving Co., Maurer, N. J.
Barrett Mfg. Co., New York City.
Eppinger & Russell Co., 165 Broadway, New York.
International Creosoting & Construction Co., Galveston, Tex.
Jennison-Wright Co., 320 Huron St., Toledo, Ohio.
Norfolk Creosoting Co., Norfolk, Va.
Northeastern Co., The, Boston, Mass.
Pittsburgh Wood Preserving Co., Pittsburgh, Pa.
Wyckoff Pipe & Creosoting Co., New York City.

Crushers and Pulverizers
Austin Mfg. Co., Chicago, Ill.
Bacon, Earle C., Havemeyer Bldg., N. Y. City.
Buchanan Co., C. G., 90 West St., New York City.
International Steam Pump Co., 115 Bway., N. Y. C.
Jeffrey Mfg. Co., The, 923 N. 4th St., Columbus, O.
Orton & Steinbrenner Co. Chicago, Ill.
Raymond Bros. Impact Pulverizer Co., Chicago, Ill.
Vulcan Iron Wks., 1736 Main St., Wilkes-Barre, Penn.

Culverts, Metal
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Wood & Co., R. D., Philadelphia, Penn.

Curb and Gutter forms
Blaw Steel Construction Co., Pittsburgh, Penn.

Curb, Steel Protected Concrete
Trussed Concrete Steel Co., Dept. 12, Youngstown, Ohio.
"Kahn" curb bars.
Representatives in principal cities.

Derricks
American Bridge Co., 30 Church St., N. Y. City.
Hayward Co., The, 50 Church St., New York City.
Lidgerwood Mfg. Co., 96 Liberty St., N. Y. City.
Nat'l Hoisting Eng. Co., Bergen St., Harrison, N. J.
Terry & Tench Co., Inc., 70 E. 45th St., N. Y. C.

Derrick Irons
Hayward Co., The, 50 Church St., New York City.
Union Iron Wks., West Shore Sta., Hoboken, N. J.

Ditching Machinery
Austin Drainage Excavator Co., F. C.
Exchange, Chicago, Ill.
Marion Steam Shovel Co., Station M, M
Smith Co., The T. L., 1170 32nd St., M
"Albrecht" excavator and loader.

Diving Apparatus
Morse & Son, Inc., A. J., 221 High St.,

Doors, Steel and Wood (Rolling)
Kinnear Mfg. Co., Columbus, Ohio.

Drafting Machines
Universal Drafting Machine Co., Clevel

Drag Line Cableway Excavators
Cable Excavator Co., Com'l Trust Bldg.
Insley Mfg. Co., Indianapolis, Ind.
Lidgerwood Mfg. Co., 96 Liberty St., N

Drawing Materials
Aloe Co., A. S., 617 Olive St., St. Louis
Hardtmuth, L. & C., 34 E. 23rd St., N.
"Kohinoor" brand.
Keuffel & Esser Co., New York. Hoboke
Kolesch & Co., New York City.

Drawing Tables
Economy Drawing Table Co., Toledo, O
Kolesch & Co., New York City.

Dredges
Flory Mfg. Co., S., Bangor, Penn.
Hayward Co., The, 50 Church St., New
Lidgerwood Mfg. Co., 96 Liberty St., N
Marion Steam Shovel Co., Station M, M
Morris Machine Works, Baldwinsville,

Drills, Air
Chicago Pneumatic Tool Co., Chicago,

Drills, Core
Ingersoll-Rand Co., 11 Broadway, New
Keystone Driller Co., Beaver Falls, Pe
McKiernan-Terry Drill Co., 234 Bway.,
Sullivan Mach. Co., 122 S. Mich. Ave.,

Drills, Electric
Independent Pneumatic Tool Co., Chic

Drills, Hammer
Ingersoll-Rand Co., 11 Broadway, New
"Jackhamer," "Butterfly," "Leyner
"Jackstoper."
McKiernan-Terry Drill Co., 234 Bway.
Sullivan Mach. Co., 122 S. Mich. Ave.,

Drills, Pneumatic
Chicago Pneumatic Tool Co., Chicago,
Independent Pneumatic Tool Co., Chic

Drills, Rock
Ingersoll-Rand Co., 11 Broadway, New
"Butterfly," "Sergeant." Also quarry
marine types.
Jeffrey Mfg. Co., The, 923 N. 4th St., Co
McKiernan-Terry Drill Co., 234 Bway.
Sullivan Mach. Co., 122 S. Mich. Ave.

Dryers
American Blower Co., Detroit, Mich.

Dynamite
Aetna Explosives Co., Inc., 2 Rector S

Elevators, Bucket
Jeffrey Mfg. Co., The, Columbus, Ohio
Ohio Loco. Crane Co., Mansfield St.,
Webster Mfg. Co., The, Tiffin, Ohio.

Elevators, Concrete
Ohio Loco. Crane Co., Mansfield St.,
Ransome Concrete Machinery Co., Dun
Cable: Racomaw. Branches: Chic
delphia, Boston, New York, Columb
Automatic dump.

Engines, Gas and Gasoline
Alberger Gas Engine Co., 281 Chicag
falo, N. Y.
Fairbanks-Morse Co., Chicago, Ill.
International Steam Pump Co., 115 Bw
National Meter Co., New York City.

Engines, Oil
Fairbanks, Morse & Co., Chicago, Ill.

Engines, Pumping
Blake & Knowles Steam Pump Works
Cambridge, Mass.
Fairbanks, Morse & Co., Chicago, Ill.
International Steam Pump Co., 115 Bw
Morris Machine Works, Baldwinsville,
Worthington, Henry R., 115 Broadway,

Engines, Steam
American Blower Co., Detroit, Mich.
Up to 160 hp.
Vertical. Single, double and compoun
Ball Engine Co., Erie, Penn.
Erie Steam Shovel Co., Erie, Penn.
Lawrence Machine Co., Lawrence, M

Excavating Attachment Derrick
Union Iron Wks., West Shore Sta., Ho

LEHIGH PORTLAND CEMENT CO.
LEHIGH
ALLENTOWN, PA.- CHICAGO, ILL.

Consider the Trade Mark

It is equivalent to a signature of quality and its fair name is jealously protected by the manufacturer.

The value of any advertising or sales propaganda is made—or broken by the reputation of the trade mark or trade name.

Logically, those firms which feature most their trade mark are most careful in maintaining the quality of their product.

Consider the Trade Mark

LEHIGH CEMENT

Concrete for Permanence

See the Cement Manufacturers' Exhibit at the Cement Show, Chicago, February 12-19.

Anderson Avenue, Bergen County, New Jersey. Standard Mixing Asphalt.

Standard Mixing Asphalt For Road Making By the Mixing Process

Assuming the stone to be correctly graded, a successful bituminous concrete roadway depends on the quality of the asphalt. We have developed especially for this purpose

STANDARD MIXING ASPHALT

Standard Mixing Asphalt, like all other Standard Asphalts, has great cementing strength at both high and low temperatures, and high ductility. It is not necessary to cut this asphalt back with a flux, for it is prepared to the correct consistency to bind the stones thoroughly together.

Standard Mixing Asphalt is 99.8% pure, running from 5 to 33% purer than the so-called natural asphalts.

Further information willingly supplied. Ask for facts regarding our Standard Paving Asphalts and Standard Asphalt Binders.

STANDARD OIL COMPANY
(New Jersey)
Newark **Baltimore**
Geo. W. Lamson, Agent, Ry. Exch. Bldg., Chicago, Ill.

Excavating Machinery
Ball Engine Co., Erie, Penn.
Browning Co., The, Cleveland, Ohio.
Cable Excavator Co., Com'l Trust Bldg., Phila.
Carson Trench Machine Co., Boston, Mass.
Erie Steam Shovel Co., Erie, Penn.
Insley Mfg. Co., Indianapolis, Ind.
Marion Steam Shovel Co., Station M, Marion, O.
Smith Co., The T. L., 1170 32nd St., Milwaukee.
"Albrecht" excavator and loader.

Excavators, Drag Line
Hayward Co., The, 50 Church St., New York City.
Insley Mfg. Co., Indianapolis, Ind.
Lidgerwood Mfg. Co., 96 Liberty St., N. Y. City.
Parsons Co., Newton, Ia. Br., 50 Church, N. Y. C.

Expanded Metal
Berger Mfg. Co., The, Canton, Ohio.
Trussed Concrete Steel Co., Dept. 12, Youngstown, Ohio.
"Kahn" building specialties.
Representatives in principal cities.

Expansion Joints
Alberger Heater Co., 281 Chicago St., Buffalo, N. Y.

Explosives
Aetna Explosives Co., 2 Rector St., N. Y. City.

Facings, Foundry
American Blower Co., Detroit, Mich.

Filing Cases
Economy Drawing Table Co., Toledo, Ohio.

Filters, Water
American Water Softener Co., Philadelphia, Pa.
N. Y. Cont'l Jewell Filtration Co., New York.
Norwood Engr. Co., Florence, Mass.
Pittsburgh Filter Mfg. Co., Pittsburgh, Penn.
Roberts Filter Mfg. Co., Darby, Penn.

Flooring
Berlin Mills Co., Portland, Maine.
Jennison-Wright Co., 320 Huron St., Toledo, Ohio.
Johns-Manville Co., H. W., New York City.
Leopold & Co., Jas., 233 Broadway, New York.
Youngstown Iron & Steel Co., Youngstown, Ohio.

Flumes, Metal
Hinman Hydr. Mfg. Co., 1400 W. Colfax, Denver.

Form Clamps
Insley Mfg. Co., Indianapolis, Ind.
New England Column Clamp Co., Boston, Mass.

Forms, Metal, for Concrete
American Bridge Co., 30 Church St., N. Y. City.
Blaw Steel Construction Co., Pittsburgh, Penn. 165 Broadway, N. Y. City. Peoples Gas Bldg., Chicago.
Standard forms for general work or special forms to order. Sectional or collapsible.
See advertisement.
Hydraulic Pressed Steel Co., 3152 E. 61st St., Cleveland, Ohio.
These forms consists of a framing of upright and horizontal bars, fitted with clamps to secure panels, which constitute the face of the form. The main vertical pieces are U-shaped, flared at the wall and having slotted keyways in the back. The form boards, or panels, are 36x36 in., of wood, faced and edged with pressed steel. Clamps of U-shape, held to the vertical pieces by bolts or keys fitting into the keyholes, straddle the vertical piece and are driven home by wedges until they are tight against the backs of the form boards. When these boards are to be removed, the wedges are slacked and the clamps are turned parallel to the upright piece. Two men with hammers can erect the forms or remove them.

Foundations
MacArthur Concrete Pile & Foundation Co., 11 Pine St., New York City.
Simplex Concrete Piling Co., Tacony, Phila., Pa.
Underpinning & Foundation Co., 290 Broadway, New York City.

Foundation Test Boring
Phillips & Worthington, 90 West St., N. Y. City.

Frogs and Switches
Ramapo Iron Works, Main Office, Hillburn, N. Y.

Furnaces, Annealing and Tempering
American Gas Furnace Co., 24 John St., N. Y. C.
Whiting Foundry Equipment Co., Harvey, Ill.

Furnaces, Gas
American Gas Furnace Co., 24 John St., N. Y. C.

Gages
Southwark Fdry. & Mach. Co., Philadelphia, Pa.

Gages (Loss of Head)
Simplex Valve & Meter Co., Philadelphia, Penn.

Gages (Rate of Flow)
Simplex Valve & Meter Co., Philadelphia, Penn.

Garbage Disposal Apparatus
Bartlett & Snow Co., The C. O., Cleveland, Ohio.

Gas Holders
Wood & Co., R. D., Philadelphia, Penn.

Gas Producer Plants
Improved Equipment Co., 60 Wall St., N. Y. City.

Gas Producers
International Steam Pump Co., 115 Bway., N. Y. C.
Wood & Co., R. D., Philadelphia, Penn.

Gate Hoists
Whiting Foundry & Equipment Co., Harvey, Ill.

Generators
Southwark Fdry. & Mach. Co., Philadelphia, Pa.

Generators, Electric
Fairbanks, Morse & Co., Chicago, Ill.

Graders
Austin Mfg. Co., Chicago, Ill.

Granite
Master Builders Co., The, Cleveland, Ohio.

Gratings, Subway
Irving Iron Works, Long Island City, N. Y.

Grinders, Pneumatic
Independent Pneumatic Tool Co., Chicago, Ill.

Hammers, Pneumatic
Independent Pneumatic Tool Co., Chicago, Ill.

Hammers, Steam
McKiernan-Terry Drill Co., 234 Bway., N. Y. C.
Union Iron Wks., West Shore Sta., Hoboken, N. J.

Heaters, Feed Water
Alberger Heater Co., 281 Chicago St., Buffalo, N. Y.
Alberger Pump & Condenser Co., New York City.
Blake & Knowles Steam Pump Works, The, East Cambridge, Mass.
International Steam Pump Co., 115 Bway., N. Y. C.

Heaters, Service
Alberger Heater Co., 281 Chicago St., Buffalo, N. Y.

Hoists
Dake Engine Co., Grand Haven, Mich.
Fairbanks, Morse & Co., Chicago, Ill.
Lidgerwood Mfg. Co., 96 Liberty St., N. Y. City.
Nat'l Hoisting Eng. Co., Bergen St., Harrison, N. J.
Southwark Fdry. & Mach. Co., Philadelphia, Pa.
Vulcan Iron Wks., 1736 Main St., Wilkes-Barre, Penn.

Hoists, Electric
Fairbanks, Morse & Co., Chicago, Ill.
Flory Mfg. Co., S., Bangor, Penn.
Lidgerwood Mfg. Co., 96 Liberty St., N. Y. City.
Nat'l Hoisting Eng. Co., Bergen St., Harrison, N. J.
Northern Engineering Works, Detroit, Mich.

Hoists, Pneumatic
Chicago Pneumatic Tool Co., Chicago, Ill.

Hoists, Portable Pneumatic
Ingersoll-Rand Co., 11 Broadway, New York City.

Hoisting Drums
Hayward Co., The, 50 Church St., New York City.

Hoisting Engines
Fairbanks, Morse & Co., Chicago, Ill.
Flory Mfg. Co., S., Bangor, Penn.
Lidgerwood Mfg. Co., 96 Liberty St., N. Y. City.
Nat'l Hoisting Eng. Co., Bergen St., Harrison, N. J.

Hose, Metallic
American Metal Hose Co., Waterbury, Conn.
Pennsylvania Flexible Metallic Tubing Co., Broad and Race Sts., Philadelphia, Penn.

Hose, Steam
American Metal Hose Co., Waterbury, Conn.
Pennsylvania Flexible Metallic Tubing Co., Broad and Race Sts., Philadelphia, Penn.

Hose, Suction
American Metal Hose Co., Waterbury, Conn.
Pennsylvania Flexible Metallic Tubing Co., Broad and Race Sts., Philadelphia, Penn.

Humidifiers
American Blower Co., Detroit, Mich.
From 3000 cu.ft. upward.

Hydrants
Eddy Valve Co., Waterford, N. Y.
McKim Foundry & Machine Co., Lockport, N. Y.
Norwood Engr. Co., Florence, Mass.
Rensselaer Valve Co., Troy, N. Y.
Wood & Co., R. D., Philadelphia, Penn.

Hydraulic Accumulators
Southwark Fdry. & Mach. Co., Philadelphia, Pa.

Hydraulic Machinery
Southwark Fdry. & Mach. Co., Philadelphia, Pa.

Hydraulic Presses
Southwark Fdry. & Mach. Co., Philadelphia, Pa.
Wood & Co., R. D., Philadelphia, Penn.

Indicator Posts
Wood & Co., R. D., Philadelphia, Penn.

Inks and Adhesives
Higgins & Co., C. M., 271 9th St., Brookl

Inserts for Concrete
Trussed Concrete Steel Co., Dept. 12, town, Ohio.
"Trus-Con Slotted," "Kahn Adjustal
"Trus-Con National Socket" inserts.
Representatives in principal cities.

Instruments, Drawing
Aloe Co., A. S., 617 Olive St., St. Louis,
Dietzgen Co., Eugene, Chicago, Ill.
Keuffel & Esser Co., New York. Hobok
Lufkin Rule Co., Saginaw, Mich. N.

Instruments, Mathematical
Aloe Co., A. S., 617 Olive St., St. Louis,
Keuffel & Esser Co., New York. Hobok

Instruments, Surveying
Ainsworth & Sons, Wm., Denver, Colo.
Aloe Co., A. S., 617 Olive St., St. Louis,
Bausch & Lomb Optical Co., 700 St. Rochester, N. Y.
Berger & Sons, C. L., 35 William St., Transits and levels in 19 different t sizes.
Buff & Buff Mfg. Co., Jamaica Plain, B Branches: 50 Church St., New York C Monadnock Block, Chicago.
Four to 10-inch transits. Twelve t levels.
See advertisement.
Dietzgen Co., Eugene, Chicago, Ill.
Guler & Bluhm, 547 Front St., Troy, N
Gurley, W. & L. E., Troy, N. Y., and S Fourteen types of transits for surve gineers and builders. Surveyors' c Seven types of levels—special devices
Keuffel & Esser Co., New York. Hobok
Kolesch & Co., 138 Fulton St., New Y
Leupold & Voelpel, Portland, Oregon.
Weiss Instr. Co., 1622 Arapahoe Bldg., Transits, levels and prism binoculars
Williams, Brown & Earle, Philadelphia,

Intensifiers
Southwark Fdry. & Mach. Co., Philade

Jacks
McKiernan-Terry Drill Co., 234 Bway.,
Southwark Fdry. & Mach. Co., Philade

Joints, Expansion
(See Paving Joints, Expansion)

Joints, Flexible Pipe
Coldwell-Wilcox Co., Newburgh, N. Y.

Kettles, Asphalt and Tar
Union Iron Wks., West Shore Sta., Hobo

Lime Kilns
Improved Equipment Co., 60 Wall St., N

Loaders, Wagon
Jeffrey Mfg. Co., The, Columbus, Ohio.

Locomotives, Electric
Robins Conveying Belt Co., 14 Park Ro

Locomotives, Industrial
Jeffrey Mfg. Co., The, 923 N. 4th St., Co
Robins Conveying Belt Co., 14 Park Row
Vulcan Iron Works, 1736 Main St., Wi

Lumber
Berlin Mills Co., Portland, Maine.
Bowers Co., S. P., 112 N. Broad St., P

Manometers
Simplex Valve & Meter Co., Philadelp

Meters, Boiler Feed Water
Builders Iron Foundry, Providence, R
International Steam Pump Co., 115 Bwa
Pittsburgh Meter Co., East Pitsburgh
Worthington, Henry R., 115 Broadway,

Meters, Current
Gurley, W. & L. E., Troy, N. Y., and
"Price"—acoustic, electric recordin phone indicating.
Ritchie & Sons, E. S., 112 Cypress line, Mass.

Meters, Oil and Gas
Builders Iron Foundry, Providence, R
Hersey Mfg. Co., South Boston, Ma Boston, Quohersey. Branches: Bos Phila., Buffalo, Chicago, Columbus, San Francisco, Los Angeles, Portla
International Steam Pump Co., 115 Bw
National Meter Co., 84 Chambers St.,
Pittsburgh Meter Co., East Pittsburgh
Worthington, Henry R., 115 Broadway,

Meters, Steam
Builders Iron Foundry, Providence, R

History in 4 Chapters—Read 'em!

Chapter No. 1. A big metal mine operator said "Don't show me how hard your shovel is or show me any photographs or read any letters of praise. Send me two shovels. I will put them to work and I'll know very shortly whether or not they are worth anything." We sent two.

Chapter No. 2. Letter from operator: "Those two shovels did wonderful work—too wonderful to last; send me 3 dozen and I will test further." We did.

Chapter No. 3. Letter from operator: "Although those three dozen shovels behaved as well as the two—I still cannot believe that shovels even of chrome nickel steel could always be as good. Enclosed find order for 40 dozen and I will this time give you a good swing." We filled his order.

Chapter No. 4. We are getting all the business of that operator.

WYOMING-MAYARI RED EDGE SHOVELS

The only trouble with this operator was that he was using his old standards of shovel life and performance and had not fully realized that Wyoming, Mayari Shovels with Chrome Nickel Steel Blades, with Extra Selected Handles, must necessarily give at least twice the service of the best crucible steel shovels that can possibly be made.

When once this is realized and it is understood that Wyoming-Mayari Shovels are as radical and as real an improvement in their field as steel freight cars are in theirs and steam turbines are in theirs, then you can understand why these shovels do the wonderful things they do, so easily,

Ask us **now** for "Scientific Shoveling" and a catalog. We'll send you a dozen shovels on trial if you say so.

WYOMING SHOVEL WORKS
Wyoming, Penn.

THE MINIMUM LOADING COST

is entirely dependent on each individual job. The Omaha Water Board extended the power charger frame on their Smith Mixer and loaded the skip 39 feet below the machine. But this flexibility of their Smith equipment saved them the cost of distributing towers and hoisting engines. Naturally there are many installations which require power chargers or batch hoppers but the loading method which produces the lowest cost is

LOW-CHARGING

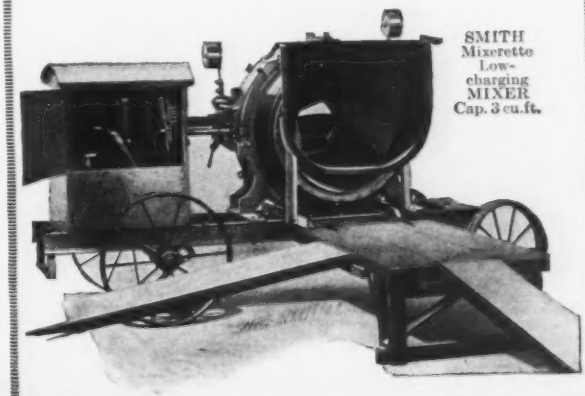
There is economy in using a Smith-Chicago Low-Charger on your work. It's mighty easy to run your barrows up the short plank to the low platform (only 18 inches high on the Smith Mixerette), upend them and dump the materials directly into the drum. Every machine is guaranteed against splashing and to discharge the entire batch in from 12 to 14 seconds. S-C Low-Chargers are built in four sizes—3 ft., 4 ft., 6 ft. and 9 ft. of mixed concrete per batch.

Which Catalog do you want?

Smith Mixer Cat. No. 51-B. Smith-Chicago Cat. No. 10-B.
S-C Low-Charger Cat. No. LC-1-B.

The T. L. SMITH CO.

1126-B Thirty-Second St., MILWAUKEE, WIS.
1404-B Old Colony Building, CHICAGO, ILL.



SMITH Mixerette Low-charging MIXER Cap. 3 cu.ft.

Meters, Water

Builders Iron Foundry, Providence, R. I. Branches: 30 Church St., N. Y. City; 2437 Oliver Bldg., Pittsburgh; 549 The Rookery, Chicago.
Venturi type. Standard sizes 2 to 60"; larger sizes to order. Capacity—standard tubes—from 3 gal. per m. minimum to 36,100 gal. per m. maximum. Weights from 50 to 58,300 lb.
Contracted tube causing difference between pressures at contraction and inlet. Differences in pressure transmitted by small piping to indicating-recording and register indicator-recording instruments, where difference in pressure is translated into rate of flow units.
Agents: N. B. Livermore & Co., San Francisco; Northwest. Equip. Co., Portland, Ore., Seattle.
Hersey Mfg. Co., South Boston, Mass. Cable: Boston, Quohersey. Branches: Boston, N. Y., Phila., Buffalo, Chicago, Columbus, O.; Atlanta, San Francisco, Los Angeles, Portland, Ore.
International Steam Pump Co., 115 Bway., N. Y. C.
National Meter Co., 84 Chambers St., N. Y. City.
Pittsburgh Meter Co., East Pittsburgh, Pa. Cable: "Meter," Pittsburgh. Branches: New York, Chicago, Kansas City, Columbia, S. C., Seattle.
Ritchie & Sons, E. S., 112 Cypress St., Brookline, Mass.
Simplex Valve & Meter Co., Philadelphia, Penn. "Venturi," "Pitot Tube," "V Notch Wier," "Rectangular Wier," "Orifice."
Thomson Meter Co., 110 Bridge St., Bklyn., N. Y. One model, eight sizes—⅝ to 6". Made in bronze only.
Worthington, Henry R., 115 Broadway, N. Y. City.

Mixers, Asphalt

Smith Co., The T. L., 1170 32nd St., Milwaukee.

Mixers (Heated), Asphalt and Concrete

Smith Co., The T. L., 1170 32nd St., Milwaukee. See "Mixers, Asphalt."

Mixers, Concrete

Foote Mfg. Co., Nunda, N. Y.
Nine sizes, 1/9 to 1 cu.yd. capacity.
Agents: Foote Concrete Mchy. Co., Chicago; Wilcox Bros., Inc., and E. J. McHarg & Co., Binghamton, N. Y.; W. C. McAnlis, Detroit; C. W. Klapproth, New York; Edward R. Bacon Co., San Francisco; Hallidie Machinery Co., Seattle; Hodson-Feenaughty Co., Portland, Ore.
International Steam Pump Co., 115 Bway., N. Y. C.
Ransome Concrete Machry. Co., Dunellen, N. J. Cable: Racomaw. Branches: Chicago, Philadelphia, Boston, New York, Columbus, Ohio.
Sizes, 4 to 80 cu.ft. Cap. 4 to 80 cu.yd. per hr. Rotary, non-tilting batch type equipped with gasoline, steam or motor drive. All types of feed.
Smith Co., The T. L., 1170 32nd St., Milwaukee.
Tilting type, 9 sizes, 4 cu.ft. to 62 cu.ft. mixed concrete. Non-tilting type, 10 sizes, 3 cu.ft. to 80 cu.ft. mixed concrete.

Mixers, Hand

Smith Co., The T. L., 1170 32nd St., Milwaukee.
Smith hand mixer, 2½ cu.ft. 1,000 lb., $120.

Mixers, Special

Smith Co., The T. L., 1170 32nd St., Milwaukee.
Glass mixers, fertilizer mixers, core-sand mixers, mortar mixers.

Molds, Pipe and Culvert

Blaw Steel Construction Co., Pittsburgh, Penn.

Motors, Electric

Fairbanks, Morse & Co., Chicago, Ill.

Packing Leather

Southwark Fdry. & Mach. Co., Philadelphia, Pa.

Paints

Barrett Mfg. Co., New York, N. Y.
Carey Co., Philip, 18 Wayne Ave., Lockland, Ohio.
Cheesman & Elliot, 100 William St., N. Y. City.
Patterson-Sargent Co., Cleveland, Ohio.

Paints, Graphite

Detroit Graphite Co., 120 Broadway, N. Y. City.
Patterson-Sargent Co., Cleveland, Ohio.

Paints, Marine

Patterson-Sargent Co., Cleveland, Ohio.

Paints, Metal Protective

Detroit Graphite Co., 120 Broadway, N. Y. City.
National Lead Co., 111 Broadway, New York, N. Y. Cable: Leadco. Branches: New York, Boston, Buffalo, Chicago, Cincinnati, Cleveland, St. Louis, San Francisco.
Steel packages of 12½, 25, 50 and 100 lb. net weight. Price: 100 lb. at 8¼c. per lb.; 25 and 50 lb. at 8½ c. per lb.; 12½ lb. at 8¾c. per lb. On lots of 500 lb. or more prices are ¼c. per lb. less. F.o.b. shipping point.
"Dutch Boy" red lead in oil. A protective paint for iron and steel. Red, brown, green and black.
Patterson-Sargent Co., Cleveland, Ohio.

Paper, Blueprint

Keuffel & Esser Co., New York. Hoboken, N. J.

Pavements

Jennison-Wright Co., 320 Huron St., Toledo, Ohio

Paving Blocks, Creosoted Wood

Barber Asphalt Paving Co., Maurer, N. J.
Jennison-Wright Co., 320 Huron st., Toledo, Ohio.
All sizes from 3 to 4" in depth.
"Kreolite" lug wood blocks are manufactured with 2 "V"-shaped compressible lugs on one side and one lug on one end, providing a space between each separate row of blocks, giving foothold for horses. When the blocks expand the lugs compress, preventing buckling and bleeding of the floor or pavement.
Eastern Representative, L. P. Drinker, 911 Crozier Bldg., 1420 Chestnut St., Philadelphia, Pa. Western Representative: F. E. Jennison, F. M. Enright, 138 N. La Salle St., Chicago, Ill. Canadian Representative: Frank B. Goodman, 270 Yonge St., Toronto, Ontario.
Wyckoff Pipe & Creosoting Co., New York City.

Paving Blocks, Kyanized Wood

Berlin Mills Co., Portland, Maine.

Paving Brick (Vitrified)

Bessemer Lime Stone Co., Youngstown, Ohio.
Bessemer block, wire-cut-lug and repressed.
National Paving Brick Mfgrs. Asso., Cleveland, O.
An association organized for a dissemination of technical knowledge relating to the use of vitrified brick as a paving material and to influence to the greatest possible extent the proper construction of brick streets and roads.

Paving Joint Filler

Barrett Mfg. Co., New York, N. Y.

Paving Joints, Expansion

Carey Co., Philip, 18 Wayne Ave., Lockland, O.
Trussed Concrete Steel Co., Dept. 12, Youngstown, Ohio.
"Kahn Armor Plate" and "Kahn Elastic Filler." Representatives in principal cities.

No use to file this list for future reference, a new one will be out next week, right up to the minute

Pencils

Hardtmuth, L. & C., 34 E. 23rd St., N. Y. City.
'Kohinoor' brand for the office and drafting room.

Piles, Concrete

MacArthur Concrete Pile & Foundation Co., 11 Pine St., New York City. Branch offices in principal cities.
The "Pedestal" pile, made-in-place with 16-inch diameter cylindrical shaft and 3-foot diameter base. Made by driving core and casing into ground; ramming out concrete to form base; filling casing with concrete and removing casing; leaving completed pile in place.
Raymond Concrete Pile Co., 140 Cedar St., New York, N. Y. Branches: Chicago, Pittsburgh, Boston, Baltimore, Philadelphia, Atlanta, Detroit, Cleveland, St. Louis, Portland, Oregon; San Francisco, Los Angeles, Omaha, Cincinnati, St. Paul, Kansas City and Montreal.
The "Raymond Standard" concrete pile is of the cast-in-place type and is made by driving an expanded steel core, covered with a reinforced sheet steel shell, into the ground to proper resistance. The core is collapsed and withdrawn and the shell left in the ground, inspected and filled with concrete. The concrete and its protecting shell form the completed pile.
See ad. always on page 3.
Simplex Concrete Piling Co., Tacony, Phila., Pa.
Underpinning & Foundation Co., 290 Broadway, New York City.

Pile Drivers

Browning Co., The, Cleveland, Ohio.
McKiernan-Terry Drill Co., 234 Bway., N. Y. C.
Union Iron Wks., West Shore Sta., Hoboken, N. J.

Pile Hammers

National Hoisting Engine Co., Harrison, N. J.

Piling, Sheet Steel

Lackawanna Steel Co., Lackawanna, N. Y. Branches: New York, Boston, Buffalo, Philadelphia, Cleveland, Cincinnati, Chicago, Detroit, St. Louis, Atlanta, San Francisco.
Arched-web, straight-web, center-flange, plate steel and protected types. Lengt
strengths suitable to cofferdam, retainin
core wall, curtain wall, shore revetmer
etc.
See advertisement.

Piling, Steel

Underpinning & Foundation Co., 290 Br
New York City.

Piling, Wood

Berlin Mills Co., Portland, Maine.
Bowers Co., S. P., 112 N. Broad St., Phil
Jennison-Wright Co., 320 Huron St., Tole

Pipe Covering

Carey Co., Philip, 18 Wayne Ave., Locklan
Johns-Manville Co., H. W., New York, N
"Asbestocel"—low-pressure steam and
"Asbesto-Sponge Felted"—high-pressu
superheated steam—and others.
Wyckoff & Son, A., Elmira, N. Y.

Pipe Fittings

American Pipe & Construction Co., 112 N
St., Philadelphia, Penn.
Builders Iron Foundry, Providence, R. I
Southwark Fdry. & Mach. Co., Philadelp

Pipe, Iron

American Cast Iron Pipe Co., Birmingha
American Pipe & Construction Co., 112 N
St., Philadelphia, Penn.
Central Foundry Co., 90 West St., N. Y
Clow & Sons, Jas. B., Chicago, Ill.
Donaldson Iron Co., Emaus, Lehigh Cou
Fox & Co., John, 253 Broadway, New Yo
Glamorgan Pipe & Foundry Co., Lynchbu
Lynchburg Foundry Co., Lynchburg, Va.
Massillon Iron & Steel Co., Masillon, Oh
National Tube Co., Pittsburgh, Penn.
Standard Cast Iron Pipe & Fdry. Co., Bri
United States Cast Iron Pipe & Foun
Philadelphia, Penn.
Warren Fdry. & Machine Co., 11 Bway.,
Wood & Co., R. D., 400 Chestnut St., Ph

Pipe Joint Compounds (Pressure)

Leadite Co., Inc., The, Land Title Bldg
delphia, Penn.

Pipe, Reinforced Concrete

Lock Joint Pipe Co., 165 Broadway, N. Y

Pipe, Riveted Steel

East Jersey Pipe Co., Fulton and Chu
New York City.
Gillespie Co., The T. A., 50 Church St., N
Kittoe Boiler & Tank Co., Canton, Ohio
McNeil & Bro., James, Pittsburgh, Penn.
Riter-Conley Mfg. Co., Pittsburgh, Penn
Struthers-Wells Co., Warren, Penn. N.
Tippett & Wood, Phillipsburg, N. J.
Weigele Riveted Steel Pipe Works, Denver

Pipe Specials

Builders Iron Foundry, Providence, R. I
Wood & Co., R. D., 400 Chestnut St., Ph

Pipe, Steel

National Tube Co., Pittsburgh, Penn.

Pipe, Wood

Michigan Pipe Co., Bay City, Mich.
National Tank & Pipe Co., Portland, O
Two inches to 14 feet diameter, up to 3
Pacific Tank & Pipe Co., 5th and Bryant
Francisco.
Portland Wood Pipe Co., Portland, Orego
Redwood Manufacturers Co., 1605 Hoba
San Francisco, Calif.
Standard Wood Pipe Co., Williamsport, I
Washington Pipe & Foundry Co., 1512-1
ter St. and 3001-3019 Asotin St.,
Wash. Cable: Wash Pipe.
Sizes from 2 inches up. Machine ban
tinuous stave and special pipe.
Wyckoff & Son Co., A., Elmira, N. Y.
Wyckoff Pipe & Creosoting Co., New Yo

Pitometers

Pitometer Co., The, 25 Elm St., New Y
"Cole" recording pitometers.

Poles, Cross-Arms, Etc. (Treated Wood)

Berlin Mills Co., Portland, Maine.
National Tank & Pipe Co., Portland, O

Poles, Tubular Steel

American Bridge Co., 30 Church St., N.
Franklin Steel Works, Franklin, Penn.
Mill capacity, 100 poles per day.
Various types for all electric service
National Tube Co., Pittsburgh, Penn.

Portable Pneumatic Hoists

Ingersoll-Rand Co., 11 Broadway, New Y

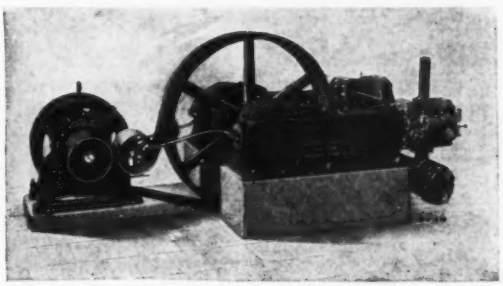
Powder

Aetna Explosives Co., Inc., 2 Rector St.

Power Transmission Machinery

Bacon, Earle C., Havemeyer Bldg., New
Leffel & Co., James, Springfield, Ohio.
Jeffrey Mfg. Co., The, 923 N. 4th St., Col
Webster Mfg. Co., The, Tiffin, Ohio.

AIR COMPRESSORS



Imperial Type Ten Steam or Belt Driven Air Compressors. Capacities 176—3508 cu.ft.

Bulletins 3311-3312

Ingersoll-Rand Air Compressors are built in a complete range of types and sizes—each of which is designed and built to furnish a dependable supply of air at the lowest cost for operation and attendance.

Ingersoll-Rand Compressors are wholly enclosed and automatically lubricated. Air cylinders are completely water jacketed on barrels and heads and ample intercoolers are provided between stages of compound machines. Air valves have proven in continued service to be most efficient and thoroughly reliable.

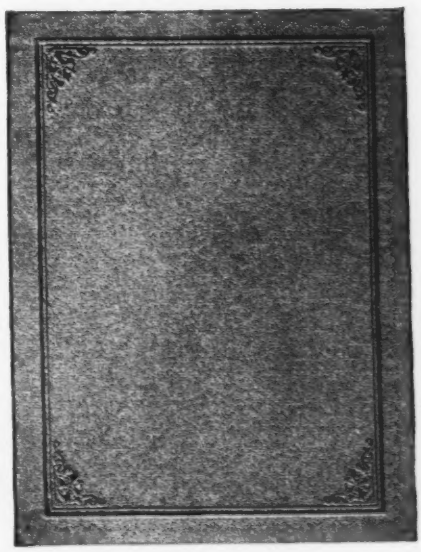
Power is applied in the most economical way, power consumption, whether a belt, electric, oil or steam engine driven unit, is reduced to a minimum.

INGERSOLL-RAND COMPANY

New York **Offices the World Over** **London**

147-C

"BUY THE BINDER"



Bye and bye you'll buy the binder. Why not now?

THIS is the BEST way to keep your copies of Engineering News.

¶ It's never too late to start keeping your copies of the **News** where you can refer to them quickly for ready reference. Start now by sending for the binder. Because when you want to know what that article said, what those figures were or what transpired then, you'll have the information in

Neat—Compact—Findable

form. You wouldn't say that it isn't worth 50 cents to you, would you? That is the price, prepaid to your door. Send your order now.

¶ A handsome, heavy board and cloth binder, heavily grained. Holds 6 months' issues. Easily manipulated and with the index, furnishes a bound volume ready for instant reference. Index furnished every 6 months **Free.**

ENGINEERING NEWS, 10th AVE. at 36th ST., NEW YORK

Pumps, Air
Blake & Knowles Steam Pump Works, The, East Cambridge, Mass.
Cameron Steam Pump Works, A. S., 11 Broadway, New York City.
Deane Steam Pump Plant, Holyoke, Mass.
International Steam Pump Co., 115 Bway., N. Y. C.
Southwark Fdry. & Mach. Co., Philadelphia, Pa.

Pumps, Air Lift
Harris Air Pump Co., Indianapolis, Ind.
13 sizes—1 to 8". Cap. 5 to 2000 gal. per m.
Ingersoll-Rand Co., 11 Broadway, New York City.
International Steam Pump Co., 115 Bway., N. Y. C.
Sullivan Mach. Co., 122 S. Mich. Ave., Chicago.

Pumps, Centrifugal
Alberger Pump & Condenser Co., New York City.
American Well Works, The, Aurora, Ill.
Cameron Steam Pump Wks., A. S., 11 Broadway, New York City.
Darling Pump & Mfg. Co., Williamsport, Penn.
Fairbanks, Morse & Co., Chicago, Ill.
Goulds Mfg. Co., Seneca Falls, N. Y. Branches: Boston, N. Y., Chicago, Atlanta, Pittsburgh.
International Steam Pump Co., 115 Bway., N. Y. C.
Lawrence Machine Co., Lawrence, Mass.
Lawrence Pump & Engine Co., Lawrence, Mass.
Morris Machine Works, Baldwinsville, N. Y.
Southwark Fdry. & Mach. Co., Philadelphia, Pa.
Worthington, Henry R., 115 Broadway, N. Y. City.

Pumps, Contractors'
Blake & Knowles Steam Pump Works, The, East Cambridge, Mass.
Bond Co., Harold L., Boston, Mass.
Cameron Steam Pump Works, A. S., 11 Broadway, New York City.
Deane Steam Pump Plant, Holyoke, Mass.
Fairbanks, Morse & Co., Chicago, Ill.
International Steam Pump Co., 115 Bway., N. Y. C.
Parker, A. A., Waterford, N. Y.
Pulsometer Steam Pump Co., 18 Battery Pl., N. Y. The Pulsometer is a self-contained unit which operates by the condensation of steam fed directly to it from a boiler by steam pipe or flexible metallic hose. It contains no pistons, glands, stuffing boxes or eccentrics. Has no mechanical action, therefore requires no lubrication. Requires no auxiliary device to condense its steam, no engine or motor to operate it, and no special foundation or setting, and no special boiler. Usually hung by rope or chains into the excavation where it works. The Pulsometer is designed to handle water containing large percentage of sand, mud, air, pebbles, etc.
Van Nouhuys Mach. Works, Albany, N. Y.
Worthington, Henry R., 115 Broadway, N. Y. City.

Pumps, Deep Well
American Well Works, The, Aurora, Ill.
Blake & Knowles Steam Pump Works, The, East Cambridge, Mass.
Cameron Steam Pump Works, A. S., 11 Broadway, New York City.
Cook, A. D., Lawrenceburg, Ind.
For 2 to 12' wells. Cap. 500 gal. per m.
Fairbanks, Morse & Co., Chicago, Ill.
Goulds Mfg. Co., Seneca Falls, N. Y. Branches: Boston, N. Y., Chicago, Atlanta, Pittsburgh.
International Steam Pump Co., 115 Bway., N. Y. C.
Keystone Driller Co., Beaver Falls, Penn.

Pumps, Diaphragm
Bond Co., Harold L., Boston, Mass.
Boston & Lockport Block Co., Boston, Mass.
Edson Mfg. Co., 278 Atlantic Ave., Boston, Mass.
3 sizes, 2½, 3 and 4" suc. 1800-6000 gal. per hr.
Goulds Mfg. Co., Seneca Falls, N. Y. Branches: Boston, N. Y., Chicago, Atlanta, Pittsburgh.
Parker, A. A., Waterford, N. Y.

Pumps, Dredging
Fairbanks, Morse & Co., Chicago, Ill.
International Steam Pump Co., 115 Bway., N. Y. C.
Lawrence Machine Co., Lawrence, Mass.
Lawrence Pump & Engine Co., Lawrence, Mass.
Morris Machine Works, Baldwinsville, N. Y.
Parker, A. A., Waterford, N. Y.
Worthington, Henry R., 115 Broadway, N. Y. City.

Pumps, Gasoline Portable
Deane Steam Pump Plant, Holyoke, Mass.
Parker, A. A., Waterford, N. Y.

Pumps, Hydraulic
Blake & Knowles Steam Pump Works, The, East Cambridge, Mass.

Pumps, Power
Cook, A. D., Lawrenceburg, Ind.
Deane Steam Pump Plant, Holyoke, Mass.
Fairbanks, Morse & Co., Chicago, Ill.
Goulds Mfg. Co., Seneca Falls, N. Y. Branches: Boston, N. Y., Chicago, Atlanta, Pittsburgh.
McGowan Co., John H., Cincinnati, Ohio.

Pumps, Sinking
Blake & Knowles Steam Pump Works, The, East Cambridge, Mass.

Pumps, Steam
Blake & Knowles Steam Pump Works, The, East Cambridge, Mass.
Cameron Steam Pump Works, A. S., 11 Broadway, New York City.
Deane Steam Pump Plant, Holyoke, Mass.
Fairbanks, Morse & Co., Chicago, Ill.
Keystone Driller Co., Beaver Falls, Penn.
McGowan Co., John H., Cincinnati, Ohio.
Morris Machine Works, Baldwinsville, N. Y.
Pulsometer Steam Pump Co., 18 Battery Pl., N. Y.
Southwark Fdry. & Mach. Co., Philadelphia, Pa.
Worthington, Henry R., 115 Broadway, N. Y. City.

Pumps, Turbine
Alberger Pump & Condenser Co., New York City.
American Well Works, The, Aurora, Ill.
Cameron Steam Pump Works, A. S., 11 Broadway, New York City.
Lawrence Machine Co., Lawrence, Mass.
Lawrence Pump & Engine Co., Lawrence, Mass.
Morris Machine Works, Baldwinsville, N. Y.
Southwark Fdry. & Mach. Co., Philadelphia, Pa.
Worthington, Henry R., 115 Broadway, N. Y. City.

Purifiers, Feed Water
N. Y. Cont'l Jewell Filtration Co., New York.
Norwood Engr. Co., Florence, Mass.

Rails and Fastenings
Lackawanna Steel Co., Lackawanna, N. Y. Branches: New York, Boston, Buffalo, Philadelphia, Cleveland, Cincinnati, Chicago, Detroit, St. Louis, Atlanta, San Francisco.
Standard heavy and light sections, contact rails, angle and splice bars, joint plates, tin plates, track spikes and bolts.

Rail Joints
Rail Joint Co., 185 Madison Ave., New York City.
Base supported rail joints. Types: "Continuous Tee," "Weber Tee," "Walhaupter Tee," "Continuous Step," "Continuous Insulating," "Weber Insulating," "Continuous Girder," "Weber Girder," "Continuous Frog and Switch," "100% Tee Rail Straight Angle Bar" or "Bent Angle Bar." Hot-worked high carbon steel used, oil quenched when desired.

Riveters
Southwark Fdry. & Mach. Co., Philadelphia, Pa.

Rivets
Pennsylvania Steel Co., Steelton, Penn.

Road Oils and Preservatives
Barber Asphalt Paving Co., Maurer, N. J.
Barrett Mfg. Co., New York City.
Standard Oil Co., Newark, N. J.

Road Rollers
Austin Mfg. Co., Chicago, Ill.
Buffalo Steam Roller Co., Buffalo, N. Y. "Buffalo Pitts." Two and a half to 20 tons.

Rolls, Crushing
Buchanan Co., C. G., 90 West St., N. Y. City.

Roofing
Barrett Mfg. Co., New York, N. Y.
Carey Co., Philip, 18 Wayne Ave., Lockland, Ohio.
Johns-Manville Co., H. W., New York, N. Y. Asbestos fire and acid resisting. Built-up; Roll—all weights and types; Corrugated; Shingles.

Roofing, Metal
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Berger Mfg. Co., The, Canton, Ohio.
Youngstown Iron & Steel Co., Youngstown, Ohio.

Rope, Manila
Waterbury Co., The, 63 Park Row, N. Y. City.

Rope, Transmission
Waterbury Co., The, 63 Park Row, N. Y. City.
Webster Mfg. Co., The, Tiffin, Ohio.

Rope, Wire
American Steel & Wire Co., Chicago, Ill.
Waterbury Co., The, 63 Park Row, N. Y. City.

Sash, Steel (See Window Sash, Steel)

Screens, Rotary
Jeffrey Mfg. Co., The, Columbus, Ohio.
Webster Mfg. Co., The, Tiffin, Ohio.

Screens, Well
American Well Works, The, Aurora, Ill.

Second-Hand Equipment
(See Alphabetical Index for For Sale Ads.)
Astoria Light, Heat & Power Co., The, East 132d St. and Locust Ave., New York City.

Sharpening Machines (Drill Bit)
Ingersoll-Rand Co., 11 Broadway, New York City.
Sullivan Mach. Co., 122 S. Mich. Ave., Chicago.

Sheaves
Haiss Mfg. Co., 142d St. and Rider Ave., N. Y. C.

Shoes, Wood Pipe
Marion Malleable Iron Works, Marion, Ind.

Shovels, Hand
Wyoming Shovel Works, Wyoming, Penn.

Shovels, Power
Ball Engine Co., Erie, Penn.
"Erie Steam and Electric Revolving Shovels."
Marion Steam Shovel Co., Station M, Marion, O. Cable: Barnhart. Branches: Atlanta, Chicago, New York, San Francisco, Seattle.
All standard sizes and capacities.
Electric, steam or gasoline power equipment.
Thew Automatic Shovel Co., Lorain, Ohio.

Shutters, Steel and Wood Rolling
Kinnear Mfg. Co., Columbus, Ohio.

Sidewalk Forms
Berger Mfg. Co., The, Canton, Ohio.
Blaw Steel Construction Co., Pittsburgh,

Skips
Insley Mfg. Co., Indianapolis, Ind.

Sluice Gates
Coldwell-Wilcox Co., Newburgh, N. Y.
Hinman Hydr. Mfg. Co., 1400 W. Colfax, D

Softeners, Water
American Water Softener Co., Philadelphia
N. Y. Cont'l Jewell Filtration Co., New Yor
Roberts Filter Mfg. Co., Darby, Penn.

Stacks, Steel
Wiederholdt Construction Co., St. Louis, M

Standpipes
Kittoe Boiler & Tank Co., Canton, Ohio.
Pittsburgh-Des Moines Steel Co., Pittsburgh
Struthers-Wells Co., Warren, Penn. N. Y.
Tippett & Wood, Phillipsburg, N. J.
Walsh's Holyoke Steam Boiler Works, Ho Mass.

Steam Hammers
Nat'l Hoist. Eng. Co., Bergen St., Harrison,

Steam Traps
American Blower Co., Detroit, Mich.
Tilting, return, separating, vacuum, conde

Steel (Plates and Bars)
Lackawanna Steel Co., Lackawanna, Branches: New York, Boston, Buffalo, delphia, Cleveland, Cincinnati, Chicago, St. Louis, Atlanta, San Francisco.
Sheared and universal plates, sheet bars chant bars in rounds, squares, flats, oval ovals and hexagons.

Steel Plate Construction
American Bridge Co., 30 Church St., N. Y
Blaw Steel Construction Co., Pittsburgh,
Chicago Bridge & Iron Works, Chicago,
Coatesville Boiler Works, 30 Church St., N.
East Jersey Pipe Co., Fulton and Church New York City.
Franklin Steel Works, Franklin, Penn.
Hydraulic Pressed Steel Co., 3152 E. 61 Cleveland, Ohio.
Kittoe Boiler & Tank Co., Canton, Ohio.
McNeil & Bro., James, Pittsburgh, Penn.
Pennsylvania Steel Co., Steelton, Penn.
Riter-Conley Mfg. Co., Pittsburgh, Penn.
Struthers-Wells Co., Warren, Penn.
Tippett & Wood, Phillipsburg, N. J.
Walsh's Holyoke Steam Boiler Works, H Mass.

Steel, Structural
American Bridge Co., 30 Church St., New
Belmont Iron Wks., Phila. 32 Broadway, N Mill capacity, 4,000 tons monthly.
Berlin Construction Co., Berlin, Conn.
Blaw Steel Construction Co., Pittsburgh, 165 Broadway, New York City. Peopl Bldg., Chicago.
Case Crane & Engineering Co., Columbus,
Chicago Bridge & Iron Works, Chicago,
Eastern Bridge & Structural Co., Worcester
Fort Pitt Bridge Works, Pittsburgh, Penn.
Franklin Steel Works, Franklin, Penn.
Hydraulic Pressed Steel Co., 3152 E. 61 Cleveland, Ohio.
Kenwood Bridge Co., Chicago, Ill.
Lackawanna Bridge Co., New York.
Lackawanna Steel Co., Lackawanna, Branches: New York, Boston, Buffalo, delphia, Cleveland, Cincinnati, Chicago, St. Louis, Atlanta, San Francisco.
Standard structural beams, angles and ch
MacKinnon-Holmes & Co., Sherbrooke, Que
McClintic-Marshall Co., Pittsburgh, Penn.
Milwaukee Bridge Co., Milwaukee, Wis.
Minneapolis Steel & Machry. Co., Minneap
Morava Construction Co., Chicago, Ill.
Mount Vernon Bridge Co., Mt. Vernon, Oh
Penn Bridge Co., Beaver Falls, Penn.
Phoenix Bridge Co., Phoenixville, Penn.
Pittsburgh-Des Moines Steel Co., Pittsbur
Riter-Conley Mfg. Co., Pittsburgh, Penn.
Riverside Bridge Co., Martins Ferry, Ohi
Shoemaker & Co., Lewis F., Pottstown, Pe
Snare & Triest Co., Woolworth Bldg., N. Y
Strauss Bascule Bridge Co., Chicago, Ill.
Variety Iron & Steel Works, Cleveland, O
Wisconsin Bridge & Iron Co., Chicago, I

Stokers
Babcock & Wilcox Co., The, 85 Liberty S York City. Works: Barberton, Ohio. offices in principal cities.

Strainers, Well
Cook, A. D., Lawrenceburg, Ind.

Superheaters, Steam and Air
Power Specialty Co., 111 Broadway, N. Boston, Philadelphia, Pittsburgh, Chica

Swinging Gear
Dake Engine Co., Grand Haven, Mich.

An Erie Buyer wrote this Advertisement—

Advertisements have been written by the boss, by the hired man and the professional writer, but when you come right down to search for the ad that carries conviction in every line this is it:

Written by N. H. Battjes, President of the Standard Builders' Supply Company of Grand Rapids, Mich., to a prospective Erie buyer, dated October 21.

"We received our ERIE Shovel during the month of May, have operated it continuously ever since, first for the purpose of grading and excavating for railroad tracks and later on for loading gravel.

"We are highly pleased with the shovel and believe it to be the best shovel that we have ever operated. It has a much longer and higher reach than the——— shovel. Whereas, we formerly owned two——shovels, which were satisfactory, we believe the ERIE Shovel far superior to the———and if we had to purchase a shovel today we would purchase none other. If you have use for a shovel you cannot make a mistake in purchasing the ERIE."

We do not purpose to gild the lily by adding anything to this advertisement beyond suggesting that now—**now**—is exactly the right time to investigate the Erie Revolving Shovel. Ask for our new Bulletin S-14 containing FACTS—FIGURES—PHOTOS, (mostly photos) you'll find it interesting.

ERIE REVOLVING SHOVEL

There are definite reasons for the superiority of the Erie Shovel. Here are a few of them:

Automatic Crowding Device—**Controls Crowding Engines so you cannot cut below grade—unless you want to. Level floor bottom readily maintained. Shallow cuts efficiently handled.**

Three Lever Control—**Just three levers and a foot brake to handle. Greatly simplifies operation of shovel. Enables operator to handle greater yardage.**

Large Working Range—**Cuts 35 feet wide on floor bottom. 50 feet wide at height of eight feet. Wagons can be loaded on top of an 8-ft. bank.**

Sturdy, Accessible Construction—**Erie Shovels are built for service. The operating mechanism is all accessible. Nothing "buried" or "hidden."**

BALL ENGINE COMPANY, ERIE, PA.

Tanks, Automatic Sprinkler
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.

Tables and Boards, Drawing
Dietzgen Co., Eugene, Chicago, Ill.
Keuffel & Esser Co., New York. Hoboken, N. J.

Tanks and Towers
American Bridge Co., 30 Church St., N. Y. City.
Baltimore Cooperage Co., The, Baltimore, Md. Cable Address: Tanktowers, W. U. Code. Wooden and metal tanks, steel towers. All sizes for water, acids, chemicals, etc.
Blaw Steel Construction Co., Pittsburgh, Penn.
Chicago Bridge & Iron Works, Chicago, Ill.
Coatesville Boiler Works, 30 Church St., N. Y. C.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Struthers-Wells Co., Warren, Penn.
Tippett & Wood, Phillipsburg, N. J.
Walsh's Holyoke Steam Boiler Works, Holyoke, Mass.

Tanks, Wood
National Tank & Pipe Co., Portland, Oregon.
Pacific Tank & Pipe Co., 5th and Bryant St., San Francisco.
Portland Wood Pipe Co., Portland, Oregon.
Redwood Manufacturers Co., 1605 Hobart Bldg., San Francisco, Calif.
Washington Pipe & Foundry Co., 1512-1620 Center St. and 3001-3019 Asotin St., Tacoma, Wash. Cable: Wash Pipe.

Tapes, Steel and Metallic
Aloe Co., A. S., 617 Olive St., St. Louis, Mo.
Dietzgen Co., Eugene, Chicago, Ill.
Keuffel & Esser Co., New York. Hoboken, N. J.
Lufkin Rule Co., Saginaw, Mich. N. Y. City;

Test Boring
Sullivan Mach. Co., 122 S. Mich. Ave., Chicago.

Ties, Steel
American Bridge Co., 30 Church St., N. Y. City.

Ties, Treated Wood
Berlin Mills Co., Portland, Maine.

Timber (Treated)
Berlin Mills Co., Portland, Maine.
Eppinger & Russell Co., 165 Broadway, New York.

Tools, Pneumatic
Chicago Pneumatic Tool Co., Chicago, Ill.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City.

Tracing Cloth
Hardtmuth, L. & C., 34 E. 23rd St., N. Y. City. "Kohinoor" brand.

Tramways
American Steel & Wire Co., Chicago, Ill.
Waterbury Co., The, 63 Park Row, New York.

Transmission Towers, Galvanized
American Bridge Co., 30 Church St., New York.
Blaw Steel Construction Co., Pittsburgh, Penn.

Trenching Machinery
Austin Drainage Excavator Co., F. C., Railway Exchange Bldg., Chicago, Ill.
Bail Engine Co., Erie, Penn.
Carson Trench Mach. Co., Boston, Mass.
Erie Steam Shovel Co., Erie, Penn.
Marion Steam Shovel Co., Station M, Marion, O.
Parsons Co., Newton, Ia. 50 Church St., N. Y. C.

Turbines, Steam
Allberger Pump & Condenser Co., New York City.

Turbines, Water
Leffel & Co., James, Springfield, Ohio.

Card lists of Equipment are hard to keep. they won't correct themselves. this list will

Turnbuckles
American Bridge Co., 30 Church St., New York.

Turntables
American Bridge Co., 30 Church St., New York.
Pennsylvania Steel Co., Steelton, Penn.
Whiting Foundry Equipment Co., Harvey, Ill.

Turpentine
Berlin Mills Co., Portland, Maine.

Underpinning
Underpinning & Foundation Co., 290 Bway., N. Y.

Valves, Altitude
Simplex Valve & Meter Co., Philadelphia, Penn.

Valves, Automatic Air
Simplex Valve & Meter Co., Philadelphia, Penn.

Valves, Water, Steam, Gas
Coldwell-Wilcox Co., Newburgh, N. Y.
Darling Pump & Mfg. Co., Williamsport, Pe
Eddy Valve Co., Waterford, N. Y.
Golden-Anderson Valve Specialty Co., 1202 ton Bldg., Pittsburgh, Penn.
"Controlling Altitude"—automatically mai uniform water level in tanks, etc. "W Regulating"—control a reduced pressure re less of initial volume. "Triple Acting No turn"—for automatically protecting boilers steam lines. "Float Valves" for maintai water.
Norwood Engrg. Co., Florence, Mass.
Rensselaer Valve Co., Troy, N. Y.
Southwark Fdry. & Mach. Co., Philadelphia

Ventilating Apparatus
American Blower Co., Detroit, Mich.
Lupton's Sons Co., David, Westmoreland Tulip Sts., Philadelphia, Penn.

Wagon Loaders
Haiss Mfg. Co., 142nd St. and Rider Ave., N.

Wagons, Dump
Austin Mfg. Co., Chicago, Ill.
Western Wheeled Scraper Co., Aurora, Ill.

Water, Stage Recorders
Leupold & Voelpel, Portland, Oregon.

Waterproofing
Barrett Mfg. Co., New York City.
Carey Co., Philip, 18 Wayne Ave., Lockland,
Johns-Manville Co., H. W., New York City,

Well Drillers
Phillips & Worthington, 90 West St., N. Y.

Well Drilling Machines
American Well Works, The, Aurora, Ill.
Keystone Driller Co., Beaver Falls, Penn.

Winches
Lidgerwood Mfg. Co., 96 Liberty St., N. Y.

Window Sash, Steel
Lupton's Sons Co., David, Westmoreland Tulip Sts., Philadelphia, Penn.
Trussed Concrete Steel Co., Dept. 12, Yo town, Ohio.
Representatives in principal cities.
"United" steel sash; horizontally and ver pivoted sash. Counterbalanced and co weighted sliding sash. Center pivoted an hung continuous sash. Steel and glass tions, sliding and swing doors. Casement

Wire Clips
Marion Malleable Iron Works, Marion, Ind

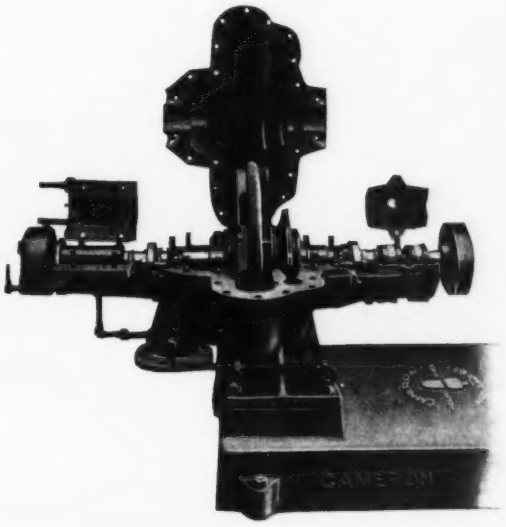
Wood Preserving
Barber Asphalt Paving Co., Maurer, N. J.
Barrett Mfg. Co., New York City, N. Y.
Carbolineum Wood Preserving Co., 181 Fr St., New York City, N. Y.
International Creosoting & Construction Galveston, Tex.
Northeastern Co., The, Boston, Mass.
Pittsburgh Wood Preserving Co., Pittsburgh

IF YOU are in the market for any class of machinery or equipment which you cannot find in the Buying Section, Engineering News will have your wants published free of cost and thus put you in touch with the right manufacturer or dealer.

Business News Department

The Slogan of the Cameron—"Character: the Grandest Thing"

In Long, Steady, Unbroken Pumping



There is where pump efficiency tells and there is where

CAMERON

MULTI-STAGE TURBINE CENTRIFUGALS

have proved their superiority. In Municipal Pumping Stations and Irrigation Systems, these long pulls are the rule—and engineers have found Cameron Centrifugals best adapted to this work.

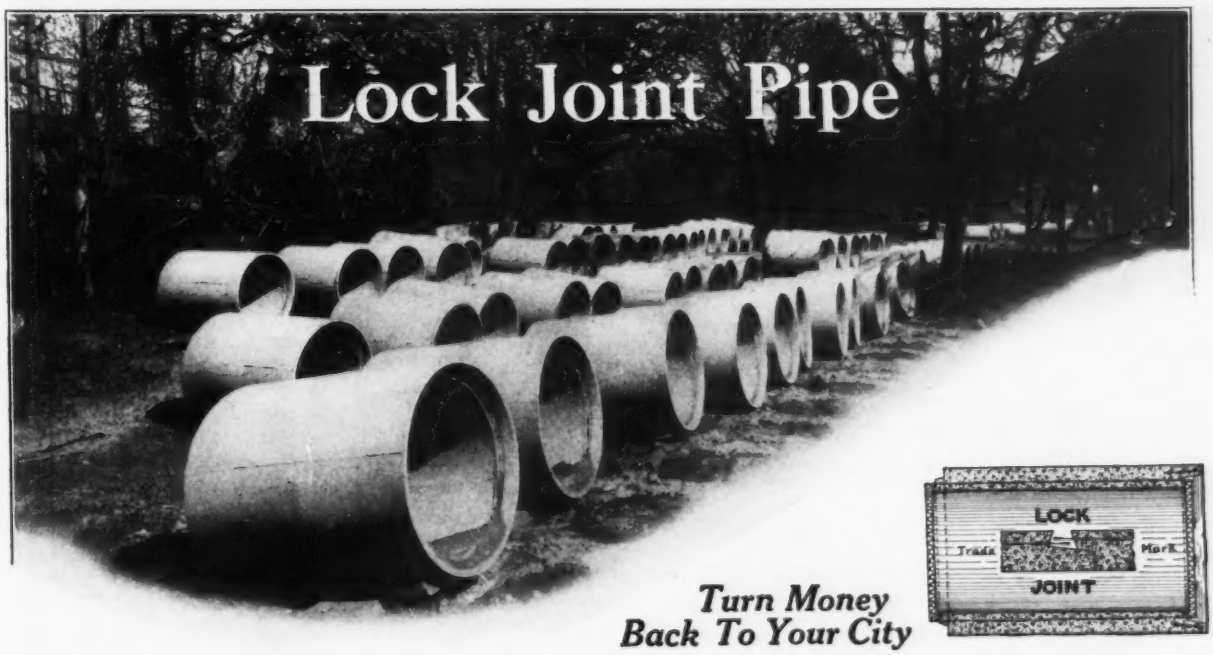
These pumps are extremely simple, compact, easily installed, and are driven by electric motor, or other motive power.

Note the accessibility. Casings are split horizontally, so that every working part may be reached without disturbing pipe connections or pump alignment. Built of the finest material. Highest efficiency.

Write now for Bulletin No. 151.

A. S. Cameron Steam Pump Works
11 Broadway, New York
Offices the World Over

Lock Joint Pipe



Turn Money Back To Your City

Build your next sewer or water line of the Meriwether System Lock Joint Pipe. You can use your own citizens for labor—you can buy your materials locally, **and get the best. Write for the 100-page book of photographs showing many Lock Joint Pipe jobs.**

Lock Joint Pipe Company, **165 Broadway, New York City**
The Canadian Lock Joint Pipe Co., Limited, Regina, Sask., Can. **Pacific Lock Joint Pipe Co., Tacoma, Seattle, Wash.**

ALPHABETICAL INDEX TO ADVERTISERS

	Page
Aetna Explosives Co., Inc.	56
Ainsworth & Sons, Wm.	62
Alberger Heater Co.	39
Alberger Pump & Condenser Co.	41
Aloe Co., A. S.	64
Alpha Portland Cement Co.	8
American Blower Co.	42
American Bridge Co.	61
American Cast Iron Pipe Co.	44
American Creosote Works.	55
American Gas Furnace Co.	44
American Metal Hose Co.	49
American Pipe & Construction Co.	44
American Sheet & Tin Plate Co.	42
American Steel & Wire Co.	54
American Water Softener Co.	47
American Well Works, The	3d cover
Astoria Light, Heat & Power Co.	38
Atlas Portland Cement Co.	56
Austin Drainage Excavator Co., F. C.	52
Austin Mfg. Co.	50
Babcock & Wilcox Co., The	43
Bacon, Earle C.	50
Ball Engine Co.	77
Barber Asphalt Paving Co. (Maurer)	55
Barrett Mfg. Co. 4th cover,	55
Bartlett & Snow Co., C. O.	42
Bausch & Lomb Optical Co.	63
Belmont Iron Works.	61
Bergen & Lindeman, Inc.	44
Berger & Sons, C. L.	63
Berger Mfg. Co., The	57
Berlin Construction Co.	59
Berlin Mills Co.	55
Blake & Knowles Steam Pump Works	41
Blaw Steel Construction Co.	39, 60
Bond Co., Harold L.	40
Boston & Lockport Block Co.	60
Bowers Co., S. P.	55
Browning Co., The	11
Buchanan Co., C. G., Inc.	51
Buff & Buff Mfg. Co.	63
Buffalo Steam Roller Co.	50
Builders Iron Foundry	47
Buyers' Cyclodepia	68
Cable Excavator Co.	54
Cameron Steam Pump Works, A. S.	79
Carbolineum Wood Preserving Co.	55
Carey Co., Philip, The	51
Carson Trench Mach. Co.	55
Case Crane & Engineering Co.	59
Central Foundry Co., The	45
Chicago Bridge & Iron Wks.	43
Chicago Pneumatic Tool Co.	51
Chicago Steel Tape Co.	64
Clow & Sons, Jas. B.	44
Coatesville Boiler Works.	42
Coldwell-Wilcox Co.	46
Consulting Engineers.	65, 66, 67
Cook, A. D.	39
Custodis Chimney Cons. Co., Alphons	44
Dake Engine Co.	38
Darling Pump & Mfg. Co.	42
Deane Steam Pump Plant.	40
Des Moines Bridge & Iron Co.	43
Dexter Portland Cement Co.	54
Dietzgen Co., Eugene	62
Directory of Consulting Engineers	65, 66, 67
Donaldson Iron Co.	44
East Jersey Pipe Co.	45
Eastern Bridge & Structural Co.	59
Economy Drawing Table Co.	64
Eddy Valve Co.	48
Edson Mfg. Co.	40
Eppinger & Russell Co.	55
Erie Steam Shovel Co.	77
Fairbanks, Morse & Co.	41
Flory Mfg. Co., S.	52
Foote Concrete Machinery Co.	51
For Sale Ads.	36
Fort Pitt Bridge Works.	59
Fox & Co., John	48
Franklin Steel Works.	57
French & Co., Samuel H.	56
Gillespie Co., T. A., The	44
Glamorgan Pipe & Foundry Co.	44
Golden-Anderson Valve Specialty Co.	49
Goulds Mfg. Co., The	39
Gurley, W. & L. E.	62
Haiss Mfg. Co., Inc., Geo.	48
Hardtmuth, L. & C.	62
Harris Air Pump Co.	42
Hartranft Cement Co., Wm. G.	54
Hayward Co., The	11
Heine Chimney Co., The	41
Heinicke, H. R., Inc.	43
Hersey Mfg. Co.	48
Higgins & Co., Chas. M.	64
Hinman Hydraulic Mfg. Co.	48
Hydraulic Pressed Steel Co.	57
Improved Equipment Co.	42
Independent Pneumatic Tool Co.	50
Industrial Works.	53
Ingersoll-Rand Co.	75
Insley Mfg. Co.	14
Inspecting Engineers.	67
International Creosoting & Construction Co.	55
International Steam Pump Co.	39, 40, 41
Jeffrey Mfg. Co., The	52
Jennison-Wright Co., The	69
Johns-Manville Co., H. W.	59
Kellogg Co., M. W., The	44
Kenwood Bridge Co.	59
Keuffel & Esser Co.	62
Keystone Driller & Pump Co.	40
Kinnear Mfg. Co., The	60
Kittoe Boiler & Tank Co.	45
Kolesch & Co.	63
Lackawanna Bridge Co.,	60
Lackawanna Steel Co. 2d cover	
Laclede Steel Co.	60
Lawrence Cement Co., The	56
Lawrence Machine Co.	42
Lawrence Pump & Engine Co., The	41
Leadite Co., Inc., The	47
Leffel & Co., James	42
Lehigh Portland Cement Co.	71
Lidgerwood Mfg. Co.	53
Link-Belt Co.	54
Lock Joint Pipe Co.	79
Lufkin Rule Co., The	64
Lupton's Sons Co., David	16
Lynchburg Foundry Co.	44
MacArthur Concrete Pile & Foundation Co.	56
MacKinnon-Holmes & Co.	59
Marion Malleable Iron Wks.	46
Marion Steam Shovel Co.	51
Massillon Iron & Steel Co.	44
Maurer & Son, Henry	58
McClintic-Marshall Co.	61
McConway & Torley Co.	49
McGowan Co., John H.	39
McGraw-Hill Book Co., Inc.	13
McKiernan-Terry Drill Co.	52
McKim Foundry & Machine Co.	48
McNeil & Bro., James	44
Metaline Co., The	54
Michigan Pipe Co., The	46
Milwaukee Bridge Co.	60
Minneapolis Steel & Machinery Co.	60
Missouri Valley Bridge & Iron Co.	60
Morava Construction Co.	58
Morris Machine Works.	7
Morse & Son, Inc., A. J.	56
Mount Vernon Bridge Co.	59
National Hoisting Engine Co.	53
National Lead Co.	58
National Meter Co.	49
National Tank & Pipe Co.	46
National Tube Co.	45, 46
Nazareth Cement Co.	56
New England Column Clamp Co.	59
N. Y. Continental Jewell Filtration Co.	48
Norfolk Creosoting Co.	55
Northeastern Co., The	55
Northern Engr. Works.	52
Norwalk Iron Works Co.	54
Norwood Engineering Co.	48
Ohio Locomotive Crane Co.	53
Orton & Steinbrenner Co.	54
Owen Bucket Co., The	54
Pacific Coast Pipe Co.	44
Pacific Tank & Pipe Co.	46
Page Woven Wire Fence Co.	59
Paragon Machine Co.	64
Parker, A. A.	42
Parsons Co., The	55
Patterson-Sargent Co., The	58
Penn Bridge Co.	60
Pennsylvania Flexible Metallic Tubing Co.	50
Pennsylvania Steel Co., The	61
Phoenix Bridge Co., The	60
Pitometer Co., The	48
Pittsburgh Block & Mfg. Co.	60
Pittsburgh-Des Moines Steel Co.	43
Pittsburgh Filter Mfg. Co.	47
Pittsburgh Meter Co.	47
Pittsburgh Wood Preserving Co.	55
Portland Wood Pipe Co.	46
Positions Open & Wanted,	37
Power Specialty Co.	42
Proposals	33, 34, 35
Pulsometer Steam Pump Co.	15
Rail Joint Co., The	50
Ramapo Iron Works.	51
Ransome Concrete Machinery Co.	10
Raymond Bros. Impact Pulverizer Co.	48
Raymond Concrete Pile Co.	3
Rensselaer Valve Co.	
Richardson, A. S.	
Ritchie & Sons, E. S.	
Riter-Conley Mfg. Co.	
Riverside Bridge Co.	
Roberts Filter Mfg. Co.	
Robins Conveying Belt	
Scherzer Rolling Lift Bridge Co.	
Schools and Colleges.	
Second-Hand Equipment	
Sessions Foundry Co., T	
Shoemaker & Co., Lewis	
Simplex Concrete Piling	
Simplex Valve & Meter	
Smith Co., The T. L.	
Smooth-On Mfg. Co.	
Snare & Triest Co., The	
Snead Architectural I Works	
Southwark Foundry & M chine Co.	
Standard Cast Iron Pipe Foundry Co.	
Standard Oil Co.	
Standard Wood Pipe Co	
Strauss Bascule Bridge	
Strobel Steel Construct Co.	
Struthers-Wells Co.	
Sullivan Machinery Co.	
Terry & Tench Co., Inc.,	
Testing Engineers.	
Thew Automatic Shovel	
Thomson Meter Co.	
Tippett & Wood.	
Trussed Concrete Steel	
Underpinning & Foun tion Co.	
Union Iron Works.	
U. S. Cast Iron Pipe Foundry Co.	
Universal Drafting Mach Co.	
Variety Iron & Steel Wo Co., The	
Vulcan Iron Works.	
Walsh's Holyoke Ste Boiler Works.	
Want Ads.	
Warren Foundry & Mach Co.	
Washington Pipe & Fo dry Co.	
Waterbury Co., The	
Weber Chimney Co., Th	
Webster Mfg. Co., The	
Weiss Instrument Co.,	
Western Wheeled Scra Co.	
Westinghouse Air Br Co.	
Whiting Foundry Equ ment Co.	
Wicks Bros. Co.	
Wiederholdt Construc Co.	
Wiley & Sons, John, Inc	
Williams, Brown & Ea	
Wisconsin Bridge & Co.	
Wood & Co., R. D.	
Worthington, Henry R.	
Wyckoff & Son Co., A.	
Wyckoff Pipe & Creoso Co.	
Wyoming Shovel Work	
Youngstown Iron & S Co., The	

RS

Page

ve Co..... 47
S..... 38
E. S..... 62
Mfg. Co..... 59
ge Co..... 60
Mfg. Co..... 47
ing Belt Co., 49

g Lift
..... 60
olleges..... 67
Equipment... 33
ry Co., The. 54
Co., Lewis F. 61
te Piling Co. 59
& Meter Co. 47
T. L..... 73
. Co..... 6
Co., The... 58
ctural Iron
..... 62
ndry & Ma-
..... 12
Iron Pipe &
..... 44
Co..... 71
d Pipe Co... 46
e Bridge Co. 60
Construction
..... 60
s Co..... 46
nery Co.... 50

Co., Inc., The 52
eers..... 67
lc Shovel Co. 52
r Co..... 47
od..... 43
ete Steel Co.4, 5

& Founda-
..... 60
orks..... 58
ron Pipe &
..... 44
ting Machine
..... 63

Steel Works
..... 56
Works..... 41

yoke Steam
s..... 46
..... 36
ry & Machine
..... 44
ipe & Foun-
..... 46
., The..... 52
ey Co., The.. 43
Co., The.... 50
nent Co., The 63
eled Scraper
..... 42
Air Brake
..... 40
ndry Equip-
..... 53
o..... 64
Construction
..... 43
John, Inc.... 9
wn & Earle. 62
idge & Iron
..... 56
. D..... 45
Henry R..... 39
n Co., A..... 47
& Creosoting
..... 55
vel Works... 73

Iron & Steel
..... 59